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Announcements & Index

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NATIONAL TECHNICAL INFORMATION SERVICE Melvin S. Day, Director

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GOVERNMENT REPORTS

Announcements & Index

Volume 80, Number 20 September 26, 1980

CONTENTS

About NTIS & How To Order ii
How To Use iii
Subject Category and Subcategory Structure iv
NTIS Products v
Sample Entries vi
Reports Announcements 4207
Subject Index SU-1
Personal Author Index PA-1
Corporate Author Index CA-1
Contract Number Index CN-1
NTIS Order/Report Number Index AR-1
Price Codes ..... Outside Back Cover

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*Committee on Scientific and Technical Information

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Category 7. Chemistry

Subcategories: Chemical Engineering; Inorganic Chemistry; Organic Chemistry; Physical Chemistry, Radio and Radiation Chemistry.

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Subcategories: Biological Oceanography; Cartography; Dynamic Oceanography; Geochemistry; Geodesy; Geography; Geology and Mineralogy; Hydrology and Limnology; Mining Engineering; Physical Oceanography; Seismology; Snow, Ice, and Permafrost; Soil Mechanics; Terrestrial Magnetism.

Category 9. Electronics and Electrical Engineering

Subcategories: Components; Computer; Electronic and Electrical Engineering; Information Theory; Subsystems; and Telemetry.

Category 10. Energy Conversion (Non-propulsive)

Subcategories: Conversion Techniques; Power Sources; Energy Storage.

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Subcategories: Mathematics and Statistics; Operations Research.

Category 13. Mechanical, Industrial, Civil, and Marine Engineering

Subcategories: Air Conditioning, Heating, Lighting, and Ventilation; Civil Engineering; Construction Equipment, Materials, and Supplies; Containers and Packaging; Couplings, Fittings, Fasteners, and Joints; Ground Transportation Equipment; Hydraulic and Pneumatic Equipment; Industrial Processes; Machinery and Tools; Marine Engineering; Pumps, Filters, Pipes, Fittings, Tubing, and Valves; Safety Engineering; Structural Engineering.

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- Energy
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SAMPLE ENTRIES

MAIN ENTRY

Report entries are arranged by subject group and field. Within fields they are arranged alphanumerically by NTIS order number (accession number); alphabetic data precedes numeric.

Field 10 ENERGY CONVERSION (NON-PROPULSIVE)

Group 10A Conversion Techniques

PB-254 315/5GA PC A16/MF A01 — Price codes
Smithsonian Science Information Exchange, Inc., Washington, D.C. — Corporate author
Information on International Research and Development Activities in the Field of Energy, David F. Hersey. May 76, 370p* NSF/RA-760057, Grant NSF-AER74-20678 — Personal author; Report title

This directory is the product of a data collection effort undertaken by the Smithsonian Science Information Exchange (SSIE) on behalf of an interagency committee formed under the U.S. State Department to provide international cooperation in energy research and development. Included is information covering 1766 ongoing and recently completed energy research projects conducted in Canada, Italy, the Federal Republic of Germany, France, the Netherlands, the United Kingdom, and 25 other countries. In addition to the title and text of project summaries, the directory contains the following indexes: Subject Index, Investigator Index, Performing Organization Index, and Supporting Organization Index. — Abstract of report

INDEX ENTRIES

Index entries are arranged alphanumerically. Titles are included in all indexes except the Contract Number index.

SUBJECT

ENERGY
Information on International Research and Development Activities in the Field of Energy.
PB-254 315/5GI 10A

Entries are sequenced by major subject term and by NTIS order number.

PERSONAL AUTHOR

HERSEY, DAVID F.
Information in International Research and Development Activities in the Field of Energy.
PB-254 315/5GI 10A

Entries are sequenced by personal author, report title, and NTIS order number.

CORPORATE AUTHOR

SMITHSONIAN SCIENCE INFORMATION EXCHANGE, INC., WASHINGTON, D.C.
Information on International Research and Development Activities in the Field of Energy.
(NSF/RA-760057)
PB-254 315/5GI 10A

Entries are sequenced by corporate author name, original report number, and NTIS order number. The monitor agency number is given following the report title.

CONTRACT GRANT NUMBER

NSF-AER74-20678
Smithsonian Science Information Exchange, Inc., Washington, D.C.
PB-254 315/5GI 10A

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ACCESSION/REPORT NUMBER

PB-254 315/5GI
Information on International Research and Development Activities in the Field of Energy.
PB-254 315/5GI 10A PC A16/MF A01

Entries are sequenced by NTIS order, original report, or monitor agency number. Price codes are given in this index.

REPORTS ANNOUNCEMENTS

1. AERONAUTICS

1A. Aerodynamics

AD-A085 245/9 PC **A02**/MF **A01**
Flow Research Co Kent WA
Three-Dimensional Flow Calculation Based on Equivalence Rule.
Final technical rept.,
Mohamed Hafez. Nov 79, 6p
Contract N00014-76-C-0880

Transonic flows around three-dimensional configurations are calculated based on the artificial compressibility method. The transonic nonlinear mixed-type equation is treated as if it were elliptic, and the artificial viscosity is added implicitly through modifying the density. Thus, standard discretization techniques and standard iterative procedures are applicable. The output of the full three-dimensional code are compared to the results of numerical implementation of two asymptotic theories; transonic equivalence rule and transonic lifting line. While the analytical asymptotic theories are limited to low or high aspect ratio configurations, it is found that the numerical algorithms based on these concepts can be employed efficiently in a wider range than the range where the asymptotic theories are strictly valid.

AD-A085 258/2 PC **A10**/MF **A01**
Lockheed-Georgia Co Marietta
Acquisition and Application of Transonic Wing and Far-Field Test Data for Three-Dimensional Computational Method Evaluation. Volume I.
Final rept. May 78-Aug 79,
B. L. Hinson, and K. P. Burdges. Mar 80, 216p
LG80ER0012-VOL-1, AFOSR-TR-80-0421
Contract F49620-78-C-0068
See also Volume 2, AD-A085 259.

A comprehensive program to acquire high Reynolds number transonic experimental data on three advanced technology wings of aspect ratio from 2.8 to 8.0, specifically for evaluation of three-dimensional computational methods, was accomplished. The wings were tested over a wide range of conditions isolated wings and in the presence of a simple fuselage in high, mid, and low wing configurations on a unique test apparatus in the Lockheed-Georgia compressible flow wind tunnel. The unique test apparatus included provisions for removal of the wind tunnel boundary layer and measurements of far-field pressures for evaluation of wind tunnel wall interference. A unique technique for evaluation of wind tunnel wall interference was developed and applied to the data. Selected three-dimensional transonic computational methods were compared with the test data. A Full potential code, FLO-22, was found to give excellent agreement with experiment for all three wings, while a small disturbance solution provided acceptable agreement only for the high aspect ratio wing. (Author)

AD-A085 259/0 PC **A99**/MF **A01**
Lockheed-Georgia Co Marietta
Acquisition and Application of Transonic Wing and Far-Field Test Data for Three-Dimensional Computational Method Evaluation. Volume II. Appendix B. Experimental Data.
Final rept. May 78-Aug 79,
B. L. Hinson, and K. P. Burdges. Mar 80, 751p
LG80ER0012-VOL-2, AFOSR-TR-80-0422
Contract F49620-78-C-0068
See also Volume 1, AD-A085 258.

This volume contains an extensive set of experimental pressure data for Wings A, B, and C. This includes data for all isolated wing and wing/fuselage configurations. No far-field pressure data, however, are included. (Author)

AD-A085 327/5 MF **A01**
Air Force Aero Propulsion Lab Wright-Patterson AFB OH
Calculation Techniques for Inviscid Two-Dimensional Supersonic Airflow.
Final rept. Sep 77-Dec 78,
M. Brian Bergsten. Sep 79, 133p Rept no. AFAPL-TR-79-2023
Availability: Microfiche copies only.

Techniques for calculating the change in properties of inviscid supersonic airflow passing over or through various two-dimensional bodies are discussed in this report. Low supersonic (M less than 4) airflows and high supersonic (M greater than 4) airflows are considered separately. Flow phenomena considered include normal shock waves, oblique shock waves, insentropic expansions, and conical shock waves for cones at zero degrees angle of attack. The adjustments required for swept wings are also discussed. Printouts of computer subroutines designed to carry out the described calculation procedures are included in an appendix to the report. Examples describing the use of the calculation techniques and computer subroutines for a swept wing, and for two typical ramjet inlets are included. A final appendix includes charts that can be used as calculation aids for airflows at Mach numbers up to 4. (Author)

AD-A085 344/0 PC **A04**/MF **A01**
Purdue Univ Lafayette IN School of Mechanical Engineering
Laser Velocimeter Measurements in Turbulent and Mixing Flows. Part II.
Interim rept. 1 Oct 78-15 Dec 79,
Warren H. Stevenson, H. Doyle Thompson, Robin Bremmer, and Timothy Roesler. Mar 80, 75p AFAPL-TR-79-2009-PT-2
Contract F33615-77-C-2010
See also report dated Mar 79, AD-A068 256.

An experimental and analytical study of subsonic flow over a rearward facing step is reported. A major emphasis of the work is the investigation of bias errors in mean velocities obtained from laser doppler velocimeter (LDV) measurements in such highly turbulent flows. Optical alignment of the specially designed LDV used in the study is described in detail. An analysis of the biasing problem is presented and preliminary measurements which appear to confirm previously predicted velocity bias errors are reported. Results of a computer model developed to describe the flow are presented together with preliminary static pressure measurements made in the flow facility. (Author)

AD-A085 709/4 PC **A07**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Engineering
Robustness Studies of Output Predictive Dead-Beat Control for Wing Flutter Application.
Master's thesis,
Earl H. Kirkwood, Jr. Dec 79, 136p Rept no. AFIT/GA/EE/80-1

A new discrete control law is implemented and examined. Robustness to noise and model errors of the control law as sample rate varies is analyzed. This analysis is conducted while controlling several different very lightly damped, single input/single output systems which are representative of the flutter dynamics of the B-52E wing. The control law performance is different at separate sample rates. A distinct range of sample rates. Another range is found to be more robust when there exists an error in the models used to calculate the closed loop control law. When these ranges of sample rates intersect, the robustness characteristics at those sample rates is found to be good with respect to both noise and model mismatch. As theoretically predicted in a relationship between condition number of the system Hankel matrix and robustness seems to exist. Hence, these simulated results appear to validate the theoretical results on robustness predicted by Reid, but on the other hand, these simulated results indicate that the total analysis of 'robustness' is a very complex issue and cannot, at this point, be totally predicted by such a parameter as simple as the condition number of the Hankel matrix. (Author)

AD-A085 712/8 PC **A04**/MF **A01**
Arnold Engineering Development Center Arnold Air Force Station TN
Boundary Layer Measurements on Slender Blunt Cones at Free-Stream Mach Number 8.
Final rept.,
L. G. Siler, and J. C. Donaldson. Dec 79, 59p
Rept no. AEDC-TSR-79-V71
Prepared in cooperation with ARO, Inc., Tullahoma, TN.

Boundary layer profiles and surface conditions were measured on a slender cone with various nose bluntnesses with a laminar boundary layer and with the wall temperature in a state of equilibrium. The measurements were made at a free-stream Mach number of 8 for unit Reynolds numbers from 1.3 tc 3.5 million per foot. Surveys were made using a hot-wire anemometer and total temperature and pressure probes. Descriptions of the test apparatus, procedures, and techniques used are given in this report. (Author)

AD-A085 770/6 PC **A10**/MF **A01**
Air Force Academy CO
Air Force Academy Aeronautics Digest - Fall 1979.
Final rept.,
E. J. Jumper, M. M. Tower, and F. Guggisberg. Apr 80, 201p Rept no. USAFA-TR-80-7
See also rept. no. USAFA-TR-79-7 dated Jul 79, AD-A075 419.

This digest covers unclassified research in aeronautics performed at the United States Air Force Academy during the six months ending 1 January 1980. This report includes individual technical papers in the specific areas of aerodynamics, fluid mechanics, experimental instrumentation, thermodynamics and heat transfer, engineering education and aeronautical history. (Author)

N80-25274/5 PC**$5.00**
National Aeronautics and Space Administration, Washington, DC.
Aeronautical Engineering: A Continuing Bibliography, Supplement 122.
May 80, 96p NASA-SP-7037(122)

This bibliography lists 303 reports, articles, and other documents introduced into the NASA scientific and technical information system in April 1980.

N80-25296/8 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Development and Validation of a Combined Rotor Fuselage Induced Flow Field Computational Method.
C. E. Freeman. Jun 80, 61p NASA-TP-1656, AVRADCOM-TR-80-B-3
Prepared in Cooperation with Army Aviation Research and Development Command, St. Louis, Mo.

A potential-flow panel method was modified to calculate the effects of a rotor wake on the time-averaged surface pressure and velocity distributions on a helicopter fuselage. The rotor-induced velocities are calculated by using a vortex-tube wake model. The calculated pressure distributions are found to compare well with experimental data obtained from tests of a wind-tunnel model.

N80-25297/6 PC **A06**/MF **A01**
Lockheed-Georgia Co., Marietta.
Exploratory Studies of the Cruise Performance of Upper Surface Blown Configurations. Experimental Program: Test Facilities, Model Design Instrumentation, and Lowspeed, High-Lift Tests.
Final Report.
J. A. Braden, J. P. Hancock, K. P. Burdges, and J. E. Hackett. Jun 80, 111p NASA-CR-3192, LG77FR0028
Contract NAS1-13871

The model hardware, test facilitels and instrumentation utilized in an experimental study of upper surface blown configurations at cruise is described. The high speed (subsonic) experimental work, studying the aerodynamic effects of wing nacelle geometric variations, was conducted around semispan model configurations composed of diversified, interchangeable components. Power simulation was provided by high pressure air ducted through closed forebody nacelles. Nozzle geometry was varied across size, exit aspect ratio, exit position and boattail angle. Three dimensional force and two dimensional pressure measurements were obtained at cruise Mach numbers from 0.5 to 0.8 and at nozzle pressure ratios up to about 3.0. The experimental investigation was supported by an analytical synthesis of the system using a vortex lattice representation with first order power effects. Results are also presented from a compatibility study in which a short haul transport is designed on the basis of the aerodynamic findings in

the experimental study as well as acoustical data obtained in a concurrent program. High lift test data are used to substantiate the projected performance of the selected transport design.

N80-25300/8 PC **A04/MF A01**
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (Germany, F.R.). Inst. fuer Aeroelastik.
Unsteady Pressure Measurements at Stall and Buffeting.
P. Bublitz. Apr 79, 52p DFVLR-MITT-79-09, ESA-TT-641
Text in German; English Summary. Report Will Also Be Announced as Translation (Esa-TT-641).

The fluid dynamics of stall and buffeting and their effects on elastic structures are described. Using a generalized form of the equations of motion and applying Fourier transformation techniques, the dynamical solution and the quantities that govern it are briefly discussed. The experimental apparatus and the measurement method are described in some detail and a few results relating to the measurement of stall on a trapezoidal stalled wing with and without strakes are presented.

N80-25302/4 PC **A04/MF A01**
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (Germany, F.R.). Inst. fuer Experimentelle Stroemungsmechanik.
Drag Measurements of Conical Afterbodies at Subsonic and Transonic Speeds.
H. Esch. 22 May 79, 65p DFVLR-FB-79-27, ESA-TT-646
Text in German; English Summary. Report Will Also Be Announced as Translation (Esa-TT-646)).

The drag of open conical afterbodies of missile bodies was measured at angles of incidence up to 20 deg. The speeds were in the subsonic and lower transonic Mach range at Reynolds numbers, based on body diameter, between 500,000 and 1,300,000. At zero incidence, the results allow a drag optimization for constant afterbody lengths and for constant base diameters.

N80-25330/5 PC **A05/MF A01**
Old Dominion Univ. Research Foundation, Norfolk, VA.
Sensor for Measuring Instantaneous Angle of Attack of Helicopter Blades.
Final Report, 13 Jan. 1975 - 31 Jul. 1979.
P. S. Barna. Jun 80, 84p NASA-CR-3297
Grant NSG-1143

Systematic investigations were performed on a variety of probes to determine their potential for possible application as sensors attached to helicopter blades to measure both the instantaneous angle of attack as well as the dynamic head during actual flight operations. After some preliminary considerations a sensor of essentially spherical shape, about 30 mm in diameter, was designed. The sensor was provided with three pressure ports, and it housed two pressure transducers required for sensing the prevailing pressures acting outside on the surface. The sensors were subsequently tested in the laboratory under a variety of flow conditions to determine their aerodynamic characteristics. Two series of tests were performed: in the first series the sensor was fixed in space while exposed to steady uniform flow, while in the second series the sensor was made to oscillate, thus simulating the cyclic pitch change of the helicopter blades. While the cyclic pitch frequencies were of about the same magnitude as encountered in flight, the flow velocities during tests fell well below those experienced in a rotating blade. The tests showed that the sensors performed satisfactorily under low subsonic flow conditions with frequencies not exceeding five Hz.

N80-25335/4 PC **A14/MF A01**
Detroit Diesel Allison, Indianapolis, IN.
Experimental Determination of Unsteady Blade Element Aerodynamics in Cascades. Volume 1: Torsion Mode Cascade.
Final Report.
R. E. Riffel, and M. D. Rothrock. Jun 80, 305p NASA-CR-159831, EDR-10119-V-1
Contract NAS3-20055

A two dimensional cascade of harmonically oscillating airfoils was designed to model a near tip section from a rotor which was known to have experienced supersonic torsional flutter. This five bladed cascade had a solidity of 1.17 and a setting angle of 1.07 rad. Graphite epoxy airfoils were fabricated to achieve the realistically high reduced frequency level of 0.44. The cascade was tested over a range of static pressure ratios approximating the blade element operating conditions of the rotor along a constant speed line which penetrated the flutter boundary. The time-steady and time-unsteady flow field surrounding the center cascade airfoil were investigated. The effects of reduced solidity and decreased setting angle on the flow field were also evaluated.

N80-25485/7 PC **A05/MF A01**
Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
La Recherche Aerospatiale, Bimonthly Bulletin No. 1979-5.
1979, 66p ESA-TT-613, ONERA-NT-1979-5
Transl. Into English of la Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1979-5, Sep. - Oct. 1979 p 287-348. Original French Report Available from Onera, Paris Ff 36.

No abstract available.

N80-25587/0 PC **A04/MF A01**
Weapons Systems Research Lab., Adelaide (Australia).
Use of a New Analytical Technique to Determine Heat Input from Inner Surface Temperatures Measured on a Hemispherical Shell During a Free Flight Experiment.
G. Jepps. Jan 79, 64p WSRL-0069-TR, AR-001-461

A technique for deriving outer surface temperature and heat transfer distributions from inner surface temperature measurements recorded from three arrays of thermocouples was investigated. A hemispherical shell which was mounted on the front of a rocket vehicle reached a maximum Mach number of 5.5 at 4 km altitude after 7 s of flight. It is concluded that the technique is successful but that the circumferential temperature and heat transfer resolutions could be improved by increasing the number of thermocouples in each array from seven to at least nine.

N80-25624/1 PC **A05/MF A01**
Sandia Labs., Albuquerque, NM. Gas Dynamics Div.
Calculation of Skin-Friction Coefficients for Low Reynolds Number Turbulent Boundary Layer Flows.
M.S. Thesis - California Univ. at Davis.
P. K. Barr. Jan 80, 82p NASA-CR-163062, SAND-79-8062
Contracts NCA2-OR180-704, EY-76-C-04-0789

An analysis is presented of the reliability of various generally accepted empirical expressions for the prediction of the skin-friction coefficient C/sub f/ of turbulent boundary layers at low Reynolds numbers in zero-pressure-gradient flows on a smooth flat plate. The skin-friction coefficients predicted from these expressions were compared to the skin-friction coefficients of experimental profiles that were determined from a graphical method formulated from the law of the wall. These expressions are found to predict values that are consistently different than those obtained from the graphical method over the range 600 Re/sub theta 2000. A curve-fitted empirical relationship was developed from the present data and yields a better estimated value of C/sub f/ in this range. The data, covering the range 200 Re/sub theta 7000, provide insight into the nature of transitional flows. They show that fully developed turbulent boundary layers occur at Reynolds numbers Re/sub theta/ down to 425. Below this level there appears to be a well-ordered evolutionary process from the laminar to the turbulent profiles. These profiles clearly display the development of the turbulent core region and the shrinking of the laminar sublayer with increasing values of Re/sub theta/.

N80-26064/9 PC **A10/MF A01**
Lockheed Engineering and Management Services Co., Inc., Houston, TX.
Computer Program Documentation Modified Version of the JA70 Aerodynamic Heating Computer Program H800 (Miniver with a Dissipia Plot Package.
L. Olmedo. Mar 80, 213p NASA-CR-160695, LEMSCO-14571
Contract NAS9-15800

The changes, modifications, and inclusions which were adapted to the current version of the MINIVER program are discussed. Extensive modifications were made to various subroutines, and a new plot package added. This plot package is the Johnson Space Center DISSPLA Graphics System currently driven under an 1110 EXEC 8 configuration. User instructions on executing the MINIVER program are provided and the plot package is described.

1B Aeronautics

AD-A085 486/9 PC **A04/MF A01**
Air Force Environmental Technical Applications Center Scott AFB IL
Wind Factor Simulation Model: User's Manual.
Final rept.,
Roger C. Whiton, and Patrick L. Herod. Apr 80, 66p Rept no. USAFETAC/TN-80/002
See also Rept. no. USAFETAC/TN-80-001.

User instructions and a concise description are provided for a Wind Factor Simulation Model (WFSM). The WFSM is a fast, economical module designed to reside as a collection of subroutines within the user's larger simulation model. The WFSM, upon call by the user, produces mean overall climatological wind factors for great circle routes between arbitrary man overall climatological wind factors for great circle routes between arbitrary points 'A' and 'B' (specified by latitude and longitude) anywhere on the globe. The WFSM produces wind factors in any of three modes (calm wind case, 90-percent worst case, and the mean wind case), for either of two altitudes (25,000 ft and 35,000 ft) for any of four seasons of the year. In addition, the model can provide great circle distance between points 'A' and 'B.' From this information and knov n airspeed, the user can calculate ground speed and adjusted flying time between 'A' and 'B.' Software solves the equation of a great circle. Program listing and flow chart are included. (Author)

AD-A085 628/6 PC **A12/MF A01**
Federal Aviation Administration Washington DC
First Commuter Air Carrier Safety Symposium, January 16 - 17, 1980.
Jan 80, 258p

This is the first commuter air carrier safety symposium held by the FAA. The objective is to review the significant problems which are inseparable from safety issues. Most of the accidents which have occurred in the last several years have involved recurring contributing factors--in operations, maintenance, and training--and most are truly avoidable. The program is directed toward a listening session and regulatory overview; the industry presented its perspectives with reliability, and air-worthiness; human factors considerations in accident prevention; and the prospects of, or needs for, airport and airway development for commuter service.

AD-A085 809/2 PC **A03/MF A01**
Army Research and Technology Labs Moffett Field CA
Dynamic Stall on Advanced Airfoil Sections,
W. J. McCroskey, K. W. McAlister, L. W. Carr, S. L. Pucci, and O. Lambert. May 80, 26p
Presented at the Annual Forum of the American Helicopter Society (36th) held in Washington, DC, May 80.

The dynamic stall characteristics of eight airfoils have been investigated in sinusoidal pitch oscillations over a wide range of two-dimensional unsteady flow conditions. The results provide a unique comparison of the effects of section geometry in a simulated rotor environment. Important differences between the various airfoils were observed, particularly when the stall regimes were penetrated only slightly. Under these circumstances, the profiles that stall gradually from the

trailing edge appear to offer an advantage. However, all of the airfoils tended increasingly toward leading-edge stall when both the severity of dynamic stall and the free-stream Mach number increased. In all cases, the parameters of the unsteady motion appear to be more important than airfoil geometry for configurations that are appropriate for helicopter rotors. (Author)

AD-A085 812/6 PC **A02**/MF **A01**
Army Research and Technology Labs Moffett Field CA
Results of a Simulator Investigation of Control System and Display Variations for an Attack Helicopter Mission,
Edwin W. Aiken, and Robert K. Merrill. May 80, 25p
Presented at the Annual Forum of the American Helicopter Society (36th) held in Washington, DC, May 80.

A piloted simulator experiment designed to assess the effects on overall system performance and pilot workload of variations in control system characteristics and display format and logic for a nighttime attack helicopter mission is described. The simulation facility provided a representation of a helmet-mounted display image consisting of flight-control and fire-control symbology superimposed on the background video from a simulated forward-looking infrared sensor. Control systems ranging from the baseline stability and control augmentation system to various hover augmentation schemes were investigated together with variations in the format and logic of the superimposed symbology. Selected control system and display failures were also simulated. The results of the experiment indicate that the baseline control/display system is unsatisfactory without improvement for the evaluation task which included a hovering target search and acquisition. Significant improvements in pilot rating were achieved by both control system and display variations. (Author)

N80-25344/6 PC **A02**/MF **A01**
Oklahoma State Univ., Stillwater. Div. of Engineering, Technology and Architecture.
Handling Qualities of Large Flexible Control-Configured Aircraft.
Final Technical Report, 1 Jan. 1979 - 30 Jun. 1980.
R. L. Swaim. Jun 80, 13p NASA-CR-163206
Grant NSG-4018

The effects on handling qualities of low frequency symmetric elastic mode interaction with the rigid body dynamics of a large flexible aircraft was analyzed by use of a mathematical pilot modeling computer simulation. An extension of the optimal control model for a human pilot was made so that the mode interaction effects on the pilot's control task could be assessed. Pilot ratings were determined for a longitudinal tracking task with parametric variations in the undamped natural frequencies of the two lowest frequency symmetric elastic modes made to induce varying amounts of mode interaction. Relating numerical performance index values associated with the frequency variations used in several dynamic cases, to a numerical Cooper-Harper pilot rating has proved successful in discriminating when the mathematical pilot can or cannot separate rigid from elastic response in the tracking task.

N80-25345/3 PC **A05**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Measurement of the Handling Characteristics of Two Light Airplanes.
Jun 80, 80p NASA-TP-1636, L-13054

A flight investigation of the handling characteristics of two single engine general aviation airplanes, one a high wing and the other a low wing, included a variety of measurements of different characteristics of the airplanes. The characteristics included those of the control systems, performance, longitudinal and lateral responses, and stall motions.

PB80-812944 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Bird Strikes and Aviation Safety. 1964-June, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Jun 80,
Guy E. Habercom, Jr. Jul 80, 117p
Supersedes NTIS/PS-79/0753 and NTIS/PS-78/0694.

Hazards to aircraft created by engine ingestion or airplane interception of birds are investigated in these Government-sponsored research reports. Bird damage assessment, structural strengthening, windshield design, and bird tracking and dispersal methods are studied. (This updated bibliography contains 107 citations, 17 of which are new entries to the previous edition.)

PB80-910406 PC**$5.00**/MF**$5.00**
National Transportation Safety Board, Washington, DC. Bureau of Accident Investigation.
Aircraft Incident Report - Eastern Airlines, Inc., Boeing 727-25 N8139, Atlanta Hartsfield International Airport, Atlanta, Georgia, August 22, 1979.
28 May 80, 4p NTSB-AAR-80-6
Paper copy also available on subscription, North American Continent price $50.00/year; all others write for quote.

On August 22, 1979, Eastern Airlines, Inc., Flight 693, a Boeing 727-25, encountered a small but intense rainshower with associated wind shears on the final approach to the William B. Hartsfield Atlanta International Airport, Atlanta, Georgia. The aircraft, with 71 passengers and 6 crewmembers on board, came within 375 ft of crashing before it exited the shower and a missed approach was completed. The National Transportation Safety Board determined that the probable cause of this incident was the unavailability to the flightcrew of timely information concerning a rapidly changing weather environment along the instrument landing system final approach course. The unavailability of this data resulted in an inadvertent encounter with a localized but heavy rainshower with associated wind shears which contained changes in the horizontal and vertical wind velocities which required the flightcrew to use extreme recovery procedures to avoid an accident. Contributing to this incident was the lack of equipment for the airport terminal area that could have detected, monitored, and provided quantitative measurements of wind shear both above and outside the airport's boundaries.

PB80-910407 PC**$5.00**/MF**$5.00**
National Transportation Safety Board, Washington, DC. Bureau of Accident Investigation.
Aircraft Accident Report - Nevada Airlines, Inc., Martin 404, N40438, Tusayan, Arizona, November 16, 1979.
28 May 80, 34p NTSB-AAR-80-7
Paper copy also available on subscription, North American Continent price $50.00/year; all others write for quote.

About 1452 m.s.t., on November 16, 1979, Nevada Airlines, Inc., Flight 2504 crashed into a clearing in a heavily wooded area about 1.5 mi north of the departure end of runway 3 at Grand Canyon National Park Airport, Tusayan, Arizona. The aircraft crashed shortly after takeoff from runway 3. Of the 44 persons aboard, 10 were injured seriously. The aircraft was damaged substantially during the crash sequence and was destroyed by ground fire. The National Transportation Safety Board determines that the probable cause of the accident was the unwanted autofeather of the left propeller just after takeoff and an encounter with turbulence and downdrafts--a combination which exceeded the aircraft's single-engine climb capability which had been degraded by the high density-altitude and a turn to avoid an obstacle in the flightpath. Also, the available climb margin was reduced by the rising terrain along the flightpath. The cause(s) for the unwanted autofeather of the left propeller could not be determined.

PB80-910409 PC**$5.00**/MF**$5.00**
National Transportation Safety Board, Washington, DC. Bureau of Accident Investigation.
Aircraft Accident Report - Butler Aircraft, Inc., Douglas DC-7, N4SW, Klamath Falls, Oregon, September 14, 1979.
10 Jun 80, 15p NTSB-AAR-80-9
Paper copy also available on subscription, North American Continent price $50.00/year; all others write for quote.

About 2047 Pacific daylight time, on September 14, 1979, a Douglas DC-7 (N4SW) owned and operated by Butler Aircraft, Inc., was transporting company employees to Medford, Oregon, when it crashed 24 miles west-northwest of Klamath Falls, Oregon. The 2 crewmembers and 10 passengers on board were killed. The aircraft struck trees on the crest of Surveyor Mountain about 7 minutes after takeoff from the Kingsley Field Municipal Airport. The aircraft was destroyed by impact and ground fire. Although the night was dark, visibility was 10 miles and the wind was calm. The National Transportation Safety Board determines that the probable cause of this accident was the flightcrew's decision to undertake a direct point to point high-cruise-speed flight at low altitudes. The crew's judgment in the selection of a low-altitude flight profile may have been influenced by their familiarity with the terrain.

1C. Aircraft

AD-A085 305/1 PC **A07**/MF **A01**
National Aeronautics and Space Administration Moffett Field CA Ames Research Center
An Experimental Evaluation of a Helicopter Rotor Section Designed by Numerical Optimization.
Technical memo.,
R. M. Hicks, and w. J. McCroskey. Mar 80, 130p
NASA-A-7956, NASA-TM-78622, USAAVRADCOM-TR-79-44

A 10-percent thick helicopter rotor section designed by numerical optimization has been tested at Mach numbers from 0.2 to 0.84 with Reynolds numbers ranging from 1.9 x ten to the 6th power at Mach 0.2 to 4 x ten to the 6th power at Mach numbers above 0.5. The airfoil section exhibited maximum lift coefficients greater than 1.3 at Mach numbers below 0.45 and a drag divergence Mach number of 0.82 for lift coefficients near 0. A moderate 'drag creep' was observed at low lift coefficients for Mach numbers greater than 0.6.

AD-A085 343/2 PC **A03**/MF **A01**
Royal Aircraft Establishment Farnborough (England)
Wind-Tunnel/Flight Comparison of the Levels of Buffeting Response Intensity for the TACT F-111.
Technical memo.,
G. F. Butler, and G. R. Spavins. 31 May 79, 29p
RAE-TM-AERO-1806, DRIC-BR-69201
Presented at USAF/NASA Symposium on Transonic Aircraft Technology, Aug 78, Lancaster, CA.

Under a UK/US collaboration programme, a wind-tunnel/flight correlation has been made of the levels of buffeting response intensity of the TACT F-111 aircraft. Using a technique which has been under development at RAE, wind-tunnel measurements of the buffeting response of a 1/8-scale half-model of conventional construction have been used to predict the response of the TACT aircraft under full-scale flight conditions. Comparison with flight measurements shows good agreement. (Author)

AD-A085 347/3 MF **A01**
Battelle Columbus Labs OH
Evaluation of Safety Programs with Respect to the Causes of Air Carrier Accidents,
T. M. Connor, and C. W. Hamilton. Jan 80, 257p
FAA-ASP-80-1
Contract DOT-FA77WA-4072
Availability:: Microfiche copies only.

The objective of this study was to determine the extent to which the FAA safety programs were aligned with the causes of air carrier accidents. The data base used in this study consisted of a total of 760 air carrier accident records compiled by the National Transportation Safety Board (NTSB) from 1966 through 1975. Analysis of these records was made with respect to NTSB-cited cause/factors. FAA programs implemented during the study time period and pertaining to safety were also included in this study. Conclusions of this study are: (1) No substantive change is required with respect to mechanical safety programs, (2) Broader investigation into the integration of environmental programs with human factors programs is required, (3) New program initiatives addressing human error problems in behavior terms are required.

AD-A085 450/5 PC **A03**/MF **A01**
Naval Air Systems Command Washington DC
Designing On-Condition Tasks for Naval Aircraft.
1 Mar 80, 50p

Contents: Preventive Maintenance Processes, A History of the 'On Condition' Maintenance Process, A Comparison of Benefits; Non-Destructive Inspection and Testing -- Current Commercial Practice, Future Opportunities; Applications -- Structures, Powerplants, Examples; Designing an On-Condition Task and Measuring Results -- Designing an 'On-Condition' Task, Measuring Results.

AD-A085 464/6 PC **A02**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
Technical Evaluation Report on the Fluid Dynamics Panel Symposium on Aerodynamic Characteristics of Controls.
Advisory rept.,
H. H. B. M. Thomas. Mar 80, 21p Rept no. AGARD-AR-157
See also Rept. no AGARD-CP-262, AD-A079 292.

This report presents an evaluation of the paper presented and the discussion held during the AGARD Fluid Dynamics Panel symposium on Aerodynamics Characteristics of Controls held 14-17 May 1979 in Pozzuoli, Italy. A brief discussion of the presentations and discussions is followed by a summary of conclusions and recommendations for action. The full test of the papers is available in AGARD Conference Proceedings No. 262, published in September 1979. (Author)

AD-A085 465/3 PC **A02**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
Technical Evaluation Report on the Flight Mechanics Panel Symposium on the Use of Computers as a Design Tool.
Advisory rept.,
Siegfried Wagner. Mar 80, 22p Rept no. AGARD-AR-158
See also Rept. no. AGARD-CP-280, AD-A083 203.

This report evaluates the AGARD Flight Mechanics Panel Symposium on 'The Use of Computers as a Design Tool (held from 3-6 September 1979 at Neubiberg, Germany. The primary conclusions were that the human being still plays a critical role during all steps of computerized aircraft design and that remarkable progress has been made in many areas related to aircraft design because of recent developments in computer hardware and software. However, there are still areas where the designer has to rely on wind tunnel and structural testing. The computer has reduced the routine work-load of the engineer to save time for creative work. But there is still a need for faster and larger computers that will probably incorporate new architectures. Recommendations are made for future activities by AGARD. The full papers of the Proceedings are published as AGARD Conference Proceedings No. 280. This Advisory Report was prepared at the request of the Flight Mechanics Panel of AGARD. (Author)

AD-A085 484/4 PC **A14**/MF **A01**
Army Materiel Systems Analysis Activity Aberdeen Proving Ground MD
An Evaluation of the Reliability, Availability, Maintainability and Durability of the Utility Tactical Transport Aircraft System.
Technical rept.,
F. C. Hopkins, C. J. Fox, D. L. Clark, N. Hagis, and S. P. Yuhas. Jan 80, 317p Rept no. AMSAA-TR-290

An evaluation of the Reliability, Availability, Maintainability and Durability (RAMD) characteristics of the Boeing YUH-61A and the Sikorsky YUH-60A UTTAS candidates was conducted. The evaluation is based on Development Test II (DT II), and Operational Test II (OT II) data. The Boeing and Sikorsky UTTAS candidates' demonstrated RAMD characteristics are compared to each other as well as to the Bell UH-1H and the requirements as stated in the UTTAS Materiel Need (MN) and the Decision Coordinating Paper (DCP). (Author)

AD-A085 490/1 PC **A04**/MF **A01**
Air Weather Service Scott AFB IL
Forecasters' Guide on Aircraft Icing.
Technical rept.
Mar 80, 61p Rept no. AWS/TR-80/001
Supersedes Rept. no. AWS-MANUAL-105-39, AD-850 596.

This report presents information on aircraft icing that forecasters can use in forecasting and briefing for aircraft operations. It covers the atmospheric conditions that are favorable for aircraft icing and also how different aircraft types affect the potential for icing. (Author)

AD-A085 587/4 MF **A01**
University of Southern California Los Angeles Dept of Aerospace Engineering
Analysis of Transonic Swept Wings Using Asymptotic and Other Numerical Methods.
Technical rept.,
H. K. Cheng, S. Y. Meng, R. Chow, and R. Smith. May 80, 30p Rept no. USCAE-138
Contract N00014-75-C-0520
Presented at the AIAA Aerospace Sciences Meeting (18th) held at Pasadena, CA on 14-16 Jan 80.
Availability: Microfiche copies only.

Asymptotic theories for high-aspect-ratio wings in transonic flow developed recently show that the three-dimensional (3-D) mixed-flow calculations may be reduced to solving a set of 2-D problems at each span station. For wings with surfaces generated from a single airfoil shape, local similutude exists in the 3-D flow structure, permitting the problems to be solved once for all span stations. This paper reviews this theoretical development. The essential elements in the theory will be identified. Their relationship to the lifting-line theory and related classical methods are discussed. Examples of similarity solutions are demonstrated for high subcritical and slightly super-critical component flows; comparisons with relaxation solutions to a full potential equation are made. The study also examines the adequacy of the existing full-potential computer code. Outstanding problems remaining for subsequent development are discussed. (Author)

AD-A085 595/7 MF **A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Engineering
Development and Application of a Subsonic Triangular Vortex Panel.
Master's thesis,
John C. Sparks. Jun 80, 87p Rept no. AFIT/GAE/AE/80J-1
Availability: Microfiche copies only.

Paneling methods are approximate techniques for solving flow problems over wings and bodies. Vortex panels are used to model flow over wings and other lifting surfaces. The author develops a triangular vortex panel having a vorticity distribution that can vary in magnitude and direction. This panel is used to predict the pressure distribution on a rectangular and a sweptback wing in subsonic flow. Lift distributions obtained compare favorably to Anderson's solution and wind tunnel results except near the wing tip. In this region, the distribution will spike before satisfying the Kutta condition imposed at the tip. Possible remedies for the tip problem are discussed. (Author)

AD-A085 619/5 PC **A02**/MF **A01**
Rockwell International Thousand Oaks CA Science Center
Computational and Simplified Analytical Treatment of Transonic Wing-Fuselage-Pylon-Store Interactions.
Final technical rept. 1 Jul 78-31 Dec 79,
Vijaya Shankar, and Norman D. Malmuth. 1980, 17p SC5172.10TR, ONR-CR212-257-IF
Contract N00014-78-C-0477
Pub. in Proceedings of the AIAA Aerospace Sciences Meeting (18th), Pasadena, CA, 14-16 Jan 80, Paper No. AIAA-80-0127.

No abstract available.

AD-A085 638/5 PC **A04**/MF **A01**
Missouri Univ-Rolla Dept of Engineering Mechanics
Response of Nonlinear Structural Panels Subjected to High Intensity Noise.
Final rept. 18 Jun-20 Aug 79,
Chuh Mei. Mar 80, 56p AFWAL-TR-80-3018
Contract F49620-79-C-0169

Lightweight aircraft structures exposed to a high intensity noise environment can fatigue fail prematurely if adequate consideration is not given to the problem. Design methods and design criteria for sonic fatigue prevention have been developed based on analytical and experimental techniques. Most of the analytical work was based upon small deflection or linear structural theory which did not agree with the experimental results. A large deflection geometrical nonlinearity was incorporated into the analysis methods for determining the structural response to high intensity noise. Using the Karman-Herrmann large deflection equations for rectangular plates, a single mode Galerkin approximation, the nonlinear differential equations of motion were obtained. The method of equivalent linearization was used to solve the nonlinear equations for mean-square displacement, mean square stresses and nonlinear frequencies at various acoustic loadings for rectangular panels. Comparisons with experimental results are presented. The results obtained agreed with the experimental results; however, additional test data are needed for an adequate quantitative comparison. (Author)

AD-A085 647/6 PC **A05**/MF **A01**
Transportation Systems Center Cambridge MA
Ground Wind Vortex Sensing System Calibration Tests.
Final rept. Apr 71-Nov 72,
T. E. Sullivan, and D. C. Burnham. Feb 80, 84p
TSC-FAA-80-4, FAA-RD-80-13

This report describes the collection of data related to the calibration of two systems for detecting and tracking aircraft wake vortices. The systems tested were the propeller anemometer Ground Wind Vortex Sensing System and the Pulsed Acoustic Vortex Sensing System. The data were analyzed and the location of the vortices as determined with these systems were compared with the vortex location as determined photographically. The tests were conducted at the Federal Aviation Administration's National Aviation Facilities Experimental Center, in Atlantic City, NJ. (Author)

AD-A085 729/2 PC **A10**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB OH
A Systems Engineering Approach to Multiple Attribute Utility Theory and Multiple Objective Optimization Theory: With Application To Aircraft Retrofit Design.
Doctoral thesis,
Aaron R. DeWispelare. Jan 80, 214p Rept no. AFIT-79-233D

Multiple criteria approaches to decision situations are receiving increased popularity due to the increasing importance society places on incorporating the non-commensurate and conflicting objectives of a situation into the choice making process. Process algorithms for multiple objective optimization theory (MOOT) and multiple attribute utility theory (MAUT) are presented at a theoretical level as well as at the application level in a systems engineering framework appropriate for choice making. A subsequent comparison of two approaches motivated a combined MOOT/MAUT methodology which utilizes, in an efficient manner, the complementary aspects of both processes. Results are presented of the application of this joint approach to a defense system acquisition problem. Specifically, a paradigm for electronic warfare aircraft retrofit was developed using the combined multicritera MOOT/MAUT process. A set of criteria was developed in this application which can be used to evaluate, in a comprehensive manner, alternative system configurations. (Author)

N80-25295/0 PC **A08**/MF **A01**
Grumman Aerospace Corp., Bethpage, NY.
Transonic Flow Field Analysis for Wing-Fuselage Configurations.
Final Report.
C. W. Boppe. May 80, 160p NASA-CR-3243
Contract NAS1-14730

A computational method for simulating the aerodynamics of wing-fuselage configurations at transonic speeds is developed. The finite difference scheme is characterized by a multiple embedded

mesh system coupled with a modified or extended small disturbance flow equation. This approach permits a high degree of computational resolution in addition to coordinate system flexibility for treating complex realistic aircraft shapes. To augment the analysis method and permit applications to a wide range of practical engineering design problems, an arbitrary fuselage geometry modeling system is incorporated as well as methodology for computing wing viscous effects. Configuration drag is broken down into its friction, wave, and lift induced components. Typical computed results for isolated bodies, isolated wings, and wing-body combinations are presented. The results are correlated with experimental data. A computer code which employs this methodology is described.

N80-25306/5 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
Equations for Determining Aircraft Motions for Accident Data.
R. E. Bach, Jr., and R. C. Wingrove. Jun 80, 24p NASA-TM-78609, A-7913

Procedures for determining a comprehensive accident scenario from a limited data set are reported. The analysis techniques accept and process data from either an Air Traffic Control radar tracking system or a foil flight data recorder. Local meteorological information at the time of the accident and aircraft performance data are also utilized. Equations for the desired aircraft motions and forces are given in terms of elements of the measurement set and certain of their time derivatives. The principal assumption made is that aircraft side force and side-slip angle are negligible. An estimation procedure is outlined for use with each data source. For the foil case, a discussion of exploiting measurement redundancy is given. Since either formulation requires estimates of measurement time derivatives, an algorithm for least squares smoothing is provided.

N80-25318/0 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
Large-Scale Wind-Tunnel Tests of Inverting Flaps on a STOL Utility Aircraft Model.
T. W. Feistel, and J. P. Morelli. Jun 80, 56p NASA-TP-1696, AVRADCOM-TM-80-A-1

A unique inverting flap system was investigated on a large scale deflected slipstream model in the Ames 40 by 80 foot wind tunnel. The subject tests utilized 33% chord double-slotted flaps on a low aspect ratio wing that was fully immersed in the propeller slipstream. Evaluation of the flap effectiveness is aided by comparisons with the results of tests of other flap systems on the same twin propeller, twin tail boom STOL utility aircraft mode. No extreme or abrupt force or moment increments were encountered when the flaps were deflected through a wide range, corresponding to the complete retraction/extension spectrum. The lift and descent capability of the inverting flaps compared very favorably with that of the other flap systems that have been tested on this model, including some with much greater mechanical complexity. As expected, the flaps caused large nose down, pitching moment increments at the high lift settings; however, the trimmed characteristics are still competitive with those obtained from the more complicated flap systems. It is believed that these flaps may have promising potential application to the design of relatively simple STOL utility aircraft with improved performance capabilities. In addition, they may merit consideration as retrofits to existing aircraft with less effective flap systems.

N80-25319/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
High-Speed T-38A Landing Gear Extension Loads.
A. L. Schmitt. Mar 80, 17p NASA-TM-58226, JSC-16497

Testing of T-38A landing gear extension at high speed and high altitude is described. The mechanisms are shown together with peak hydraulic pressure data during landing gear deployment with active and inactive strut door flaps. Results of strain gage measurements of stress on various structural members are included.

N80-25320/6 PC **A09**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Flight Service Evaluation of an Advanced Composite Empennage Component on Commercial Transport Aircraft.
Quarterly Technical Report, 1 Jan. 1976 - 31 Mar. 1976.
15 Apr 76, 180p NASA-CR-159286, QTR-3
Contract NAS1-14000

The development and flight evaluation of an advanced composite empennage component is presented. The recommended concept for the covers is graphite-epoxy hats bonded to a graphite-epoxy skin. The hat flare-out has been eliminated, instead the hat is continuous into the joint. The recommended concept for the spars is graphite-epoxy caps and a hybrid of Kevlar-49 and graphite-epoxy in the spar web. The spar cap, spar web stiffeners for attaching the ribs, and intermediate stiffeners are planned to be fabricated as a unit. Access hole in the web will be reinforced with a donut type, zero degree graphite-epoxy wound reinforcement. The miniwich design concept in the upper three ribs originally proposed is changed to a graphite-epoxy stiffened solid laminate design concept. The recommended configuration for the lower seven ribs remains as graphite-epoxy caps with aluminum cruciform diagonals. The indicated weight saving for the current advanced composite vertical fin configuration is 20.2% including a 24 lb growth allowance. The project production cost saving is approximately 1% based on a cumulative average of 250 aircraft and including only material, production labor, and quality assurance costs.

N80-25321/4 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Experimental and Analytical Transonic Flutter Characteristics of a Geared-Elevator Configuration.
C. L. Ruhlin, R. V. Doggett, Jr., and R. A. Gregory. Jun 80, 30p NASA-TP-1666, L-13544 Revised.

The flutter model represented the aft fuselage and empennage of a proposed supersonic transport airplane and had an all movable horizontal tail with a geared elevator. It was tested mounted from a sting in the transonic dynamics tunnel. Symmetric flutter boundaries were determined experimentally at Mach numbers from 0.7 to 1.14 for a geared elevator configuration (gear ratio of 2.8 to 1.0) and an ungeared elevator configuration (gear ratio of 1.0 to 1.0). Gearing the elevator increased the experimental flutter dynamic pressures about 20 percent. Flutter calculations were made for the geared elevator configuration by using two analytical methods based on subsonic lifting surface theory. Both methods analyzed the stabilizer and elevator as a single, deforming surface, but one method also allowed the elevator to be analyzed as hinged from the stabilizer. All analyses predicted lower flutter dynamic pressures than experiment with best agreement (within 12 percent) for the hinged elevator method. Considering the model as mounted from a flexible rather than rigid sting in the analyses, had only a slight effect on the flutter results but was significant in that a sting related vibration mode was identified as a potentially flutter critical mode.

N80-25334/7 PC **A11**/MF **A01**
AiResearch Mfg. Co., Torrance, CA.
Thermal-Structural Design Study of an Airframe-Integrated Scramjet.
Final Report, Jun. 1975 - Dec. 1979.
J. J. Killackey, E. A. Katinszky, S. Tepper, A. A. Vuigner, and C. C. Wright. May 80, 228p NASA-CR-159039, AIRESEARCH-78-15442-2
Contract NAS1-13984

The development and evaluation of a design concept for the cooled structures assembly for the Scramjet engine is discussed. Development concepts for engine subsystems and design concepts for the aircraft/engine interface are included. A thermal protection system was defined which makes it possible to attain a life of 100 hr and 1000 cycles, the specified goal. The coolant equivalence ratio at the Mach 10 maximum thermal loading condition is 0.6, indicating a capacity for airframe cooling. The mechanical design is feasible for manufacture using conventional materials. For the cooled structures in a six module engine, the mass per unit capture area is 1256 kg/sq m. The total mass of a six module engine assembly including the fuel system is 1502 kg.

N80-25614/2 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Theoretical Study of Nonadiabatic Boundary-Layer Stabilization Times in a Cryogenic Wind Tunnel for Typical Stainless Steel Wing and Fuselage Models.
C. B. Johnson. Jul 80, 43p NASA-TM-80212, L-13350

The time varying effect of nonadiabatic wall conditions on boundary layer properties was studied for a two dimensional wing section and an axisymmetric fuselage. The wing and fuselage sections are representative of the wing root chord and fuselage of a typical transport model for the National Transonic Facility. The analysis was made with a solid wing and three fuselage configurations (one solid and two hollow with varying skin thicknesses) all made from AISI type 310S stainless steel. The displacement thickness and local skin friction were investigated at a station on the model in terms of the time required for these two boundary layer properties to reach an adiabatic wall condition after a 50 K step change in total temperature. The analysis was made for a free stream Mach number of 0.85, a total temperature of 117 K, and stagnation pressures of 2, 6, and 9 atm.

N80-26115/9 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Measured and Predicted Impingement Noise for a Model-Scale under the Wing External Blown Flap Configuration with a Qcsee Type Nozzle.
D. J. Mckinzie, Jr.. Jun 80, 63p NASA-TM-81494, E-432

Jet/flap interaction noise was measured and predicted for a small-scale model two-flap, under-the-wing, externally blown flap configuration equipped with and without noise suppression devices. The devices consisted of short spanwise fairings centered in relationship to the jet axis and positioned in the slots between the wing and flaps. The nozzle approximated that of the Quiet Clean Short-haul Experimental Engine (QCSEE). Takeoff noise reductions of 6 dB in the flyover and 5 dB in the sideline plane were obtained over a wide range of radiation angles. Approach noise reductions of about 5 dB were obtained only in the forward quadrant of the flyover plane; no reductions were obtained in the sideline plane. Models of several noise sources were combined analytically to form an overall noise prediction, the results from which compared favorably with the measured data. The aerodynamic performance characteristics for these configurations were substantially the same in the takeoff attitude. However, in the approach attitude, the suppressed configuration produced a 6 percent reduction in the flow turning efficiency.

PATENT-4 194 519 Not available NTIS
Department of the Navy Washington DC
Hypersonic Modular Inlet.
Patent,
Clifford B. Baker, and James L. Keirsey. Filed 18 Nov 64, patented 25 Mar 80, 7p AD-D007 265/2, PAT-APPL-412 267
Supersedes PAT-APPL-412 267-64.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

This invention relates to a compact hypersonic modular inlet which divides a captured airstream and compresses it supersonically without the need for a variable geometry diffuser. According to the invention, an innerbody is provided with a plurality of perimetrically spaced inlet ducts which are defined by a single concave sidewall. The sidewalls intersect to form a center spike and radially directed, swept back leading edges. A cowling covers the inlets and is provided with a swept back leading edge adjacent to each duct, each leading edge having a profile conforming to a normal shock front. (Author)

PB80-200504 PC **A05**/MF **A01**
Office of Technology Assessment, Washington, DC.
Impact of Advanced Air Transport Technology. Part I. Advanced High-Speed Aircraft.
Apr 80, 98p OTA-T-112

This study, prepared in response to a request from the House Science and Technology Committee, examines the economic, environmental, energy, societal and safety impacts of advances in the technology of high-speed aircraft, commuter aircraft, and air cargo. Focus is strictly on the aircraft technologies and excludes areas such as the airport and terminal area capacity, and air traffic control processes. This report is the first in a series and deals solely with advanced high-speed aircraft, including both subsonic and supersonic. The specific issue addressed is whether the potential benefits of advanced supersonic transport (AST) justify increases in the levels of Federal funding for generic research and development in supersonic cruise technology.

1D. Aircraft Flight Control and Instrumentation

AD-A085 309/3 PC **A02**/MF **A01**
Smiths Industries Inc Clearwater FL Aviation Div
Reliability and Maintainability Improvement Program for the AV-8A Harrier Head-Up Display Set. Volume I. Modifications to Digital Display Indicator, IP-1351/AVQ-30(V).
Final engineering rept. 1978-1980,
Richard W. Lowrie. 1 May 80, 17p SI-1003, NADC-78080-60-VOL-1
Contract N00019-77-A-0350
See also Volume 2, AD-A085 310.

Modifications were made to the head-up display unit on the AV-8A aircraft, to improve reliability. The modifications consisted of substituting a quick-release dual combiner for the servo-driven single combiner, providing circuit protection against high voltage insulation breakdown, providing BIT-fail format indication in Test Mode 1, and U.S. sourcing of all components.

AD-A085 310/1 PC **A02**/MF **A01**
Smiths Industries Inc Clearwater FL Aviation Div
Reliability and Maintainability Improvement Program for the AV-8A/TAV-8A Harrier Head-Up Display Set. Volume II. Modifications to Display Set Control, C10626/AVQ-30(V).
Final engineering rept. 1978-1980,
Richard W. Lowrie. 1 May 80, 15p SI-1002, NADC-78080-60-VOL-2
Contract N00019-77-A-0350
See also Volume 1, AD-A085 309.

Modifications were made to the pilots control unit for the head-up display on the AV-8A aircraft, to improve reliability. The modifications consisted of a new toggle switch designed to resist breakage or bending of the toggle arm, and new assembly instructions to prevent loosening or loss of push button covers or threaded components.

AD-A085 349/9 PC **A05**/MF **A01**
Royal Aircraft Establishment Farnborough (England)
The Design of Aircraft Automatic Ride-Smoothing Systems Using Direct-Lift Control.
Technical rept.,
D. E. Fry, and J. S. Winter. May 79, 93p RAE-TR-79045, DRIC-BR-70063

This report shows how a direct-lift motivator can be used to alleviate the response to vertical turbulence of a rigid, combat-type aircraft. Optimal-control and parameter-optimisation techniques are used to design both 'open' and 'closed' loop control systems. Alternative criteria other than simply reducing the normal acceleration response are discussed. The effects of system nonlinearities such as position and rate limits are explored. Both discrete and continuous models of turbulence are used in the analysis. Some nonlinear control solutions are discussed. (Author)

N80-25275/2 PC **A16**/MF **A01**
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (Germany, F.R.). Inst. fuer Flugfuehrung.
Aircraft Integrated Data Systems.
Feb 79, 363p DFVLR-MITT-79-03
Partly in German and English. Presented at 9TH Symp. On Aircraft Integrated Data Systems, Friedrichshafen, (Germany, F.R.). 26-27 Sep. 1978.

No abstract available.

1E. Air Facilities

AD-A085 357/2 PC **A03**/MF **A01**
Civil Engineering Lab (Navy) Port Hueneme CA
Fiberglass-Reinforced Plastic Surfacing for Rapid Runway Repair by Naval Construction Forces.
Interim rept. Nov 78-Apr 79,
P. S. Springston. Oct 79, 50p Rept no. CEL-TN-1563

This report documents exploratory research conducted to develop a preliminary concept for repairing bomb-damaged runways with prefabricated fiberglass-reinforced plastic membranes. The membranes would function as traffickable caps over backfilled craters. A structural analysis has been completed using the finite element method and a design is presented for a membrane to be traffic-tested under simulated F-4 aircraft wheel loads at the Rapid Runway Repair Test Facility of the Air Force Engineering and Services Center/Research Division at Tyndall AFB, Florida. Methods for joining panels to form large membranes and a tiedown method are discussed. A general concept for rapid runway repair by the Naval Construction Forces using table-of-allowance (P25 and P31) equipment is presented. (Author)

AD-A085 438/0 MF **A01**
Econ Inc Princeton NJ
The Allocation of Runway Slots by Auction. Volume II. The Airline Management Game and Slot Auction Testing.
Final rept.,
F. M. Sand, and M. L. Balinski. 15 Apr 80, 177p FAA-AVP-80-3-VOL-2
Contract DOT-FA79WA-4374
Prepared in cooperation with Flight Transportation Associations. See also Volume 3, AD-A085 455. Availability: Microfiche copies only.

The allocation of runway slots at the high-density airports by means of an auction is studied. Previous approaches to slot auctions have not allowed for the interdependency of slot values to the air carriers--a single slot for a landing of an aircraft is likely to be of little value without a corresponding slot for a subsequent take-off of that aircraft. A Slot Exchange Auction is designed, its theoretical properties and practical implementation discussed. It is shown to allow the slot market to reach an efficient equilibrium under competitive conditions. The Airline Management Game is used to create a simulation test of the Slot Exchange Auction and its associated continuous market, the slot exchange. (Author)

AD-A085 455/4 PC **A05**/MF **A01**
Econ Inc Princeton NJ
The Allocation of Runway Slots by Auction. Volume III. Theory and Technical Issues for Implementation.
Final rept.,
F. M. Sand, and M. L. Balinski. 15 Apr 80, 87p FAA-AVP-80-3-VOL-3
Contract DOT-FA79WA-4374
See also Volume 2, AD-A085 438. Prepared in cooperation with Flight Transportation Associates.

The allocation of runway slots at the high-density airports by means of an auction is studied. Previous approaches to slot auctions have not allowed for the interdependency of slot values to the air carriers--a single slot for a landing of an aircraft is likely to be of little value without a corresponding slot for a subsequent take-off of that aircraft. A Slot Exchange Auction is designed, its theoretical properties and practical implementation discussed. It is shown to allow the slot market to reach an efficient equilibrium under competitive conditions. The Airline Management Game is used to create a simulation test of the Slot Exchange Auction and its associated continuous market, the slot exchange. (Author)

AD-A085 466/1 PC **A03**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
Aircraft Dynamic Response to Damaged Runways.
Mar 80, 39p Rept no. AGARD-R-685
Presented at Meeting of the Structures and Materials Panel (49th) held at Porz-Wahn, Germany, October 1979.

The three papers included in this Report were presented as the first stage of a study of the potential problems of aircraft dynamic response to damaged and repaired runways, and arrived at the following general conclusions. For small aircraft with relatively simple landing gear, the operation over nominal repairs was dominated by rigid body motions of the aircraft. The prediction of those motions was possible and compared reasonably well with experimental data. For large aircraft or aircraft with large external stores, the prediction of detailed loads in critical areas has met with limited success so far. Since landing gear equations are highly nonlinear, the prediction of aircraft dynamic response has required time-consuming numerical integrations. Also, the behavior of large external stores can be affected by nonlinear effects (such as rigging loads), and both landing gear and external stores nonlinearities are affected by aircraft servicing procedures and by the ambient environment. Papers presented at the 49th Meeting of the Structures and Materials Panel, Porz-Wahn, Germany, October 1979. (Author)

AD-A085 509/8 PC **A04**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg MS Geotechnical Lab
Filter Fabrics for Airport Drainage.
Final rept. May 78-Jan 79,
Samuel P. Miller. Sep 79, 75p FAA-RD-79-29
Contract DOT-FA78WAI-837

This report provides a general review of fabric experience that applies to airport construction of surface and subsurface drainage installations and develops interim guidance for design, specifications, and installation of filter fabrics. Two fabric applications of surface drainage are considered: (1) between a channel or reservoir slope and the slope protection for scour, erosion, and pipe performance, and (2) silt fences for prevention of stream pollution by sediments in runoff. Three types of subsurface drainage applications are considered: (1) trench drains, (2) separation, and (3) drainage for consolidation of soft soils. A need for long-term correlation of field performance with fabric type, soil type, soil grain size, and hydraulic characteristics is pointed out. Two levels of guidance for the use of fabrics in airport drainage are suggested for use--(1) critical applications where if the design life is long (greater than 15 years), failure of the drainage installation would endanger life or structures, or require expensive maintenance, and (2) noncritical applications for short-life projects or applications that may be easily and inexpensively replaced. Appendix A describes current FAA use of filter fabrics in drainage, and Appendix B provides specific guidance for critical and noncritical use of fabrics under the above-mentioned applications. (Author)

AD-A085 739/1 PC **A03**/MF **A01**
ECON Inc Princeton NJ
The Allocation of Runway Slots by Auction. Volume I. Executive Summary.
Final rept.,
F. M. Sand, and M. L. Balinski. 15 Apr 80, 50p FAA-AVP-80-3-VOL-1
Contract DOT-FA79WA-4374
See also Volume 2, AD-A085-438.

The allocation of runway slots at the high-density airports by means of an auction is studied. Previous approaches to slot auctions have not allowed for the interdependency of slot values to the air carriers--a single slot for a landing of an aircraft is likely to be of little value without a corresponding slot for a subsequent take-off of that aircraft. A Slot Exchange Auction is designed, its theoretical properties and practical implementation discussed. It is shown to allow the slot market to reach an efficient equilibrium under competitive conditions. The Airline Management Game is used to create a simulation test of the Slot Exchange Auction and its associated continuous market, the slot exchange. (Author)

PB80-812860 PC N01/MF N01
National Technical Information Service, Springfield, VA.
Airfield Pavement Evaluation. July, 1975-June, 1980 (Citations from the NTIS Data Base).
Rept. for Jul 75-Jun 80,
Guy E. Habercom, Jr. Jul 80, 211p
Supersedes NTIS/PS-79/0754 and NTIS/PS-78/0685. See also 1964-1970, NTIS/PS-76/0578, 1971-1972, NTIS/PS-76/0579, and 1973-June, 1975, NTIS/PS-76/0580.

The bibliography contains abstracts of Government-sponsored research reports relative to airfield pavement structures. Durability, wear resistance, skid resistance, and surface qualities are analyzed and evaluated. (This updated bibliography contains 202 citations, 12 of which are new entries to the previous edition.)

2. AGRICULTURE

2B. Agricultural Economics

PB80-190309 PC A03/MF A01
Economics, Statistics, and Cooperatives Service, Washington, DC. International Economics Div.
Causes and Consequences of Restrictions on United States Agricultural Exports, 1973 to 1975,
Philip L. Paarlberg. 26 Feb 80, 37p

Exports of grains, soybeans and related products have been restricted by the United States on three occasions prior to January 4, 1980. The study examines the causes and consequences of periodic actions by the United States to restrict exports of agricultural commodities. In none of the cases examined does there appear to have been a longrun reduction in demand for U.S. exports as a result of the trade restrictions. The loss in overseas soybean markets after 1973 would have occurred even without the 1973 U.S. export embargo. Despite restrictions on sales to the Soviet Union in 1974 and 1975, that country remained a major market for U.S. grain.

PB80-191273 PC A11/MF A01
Bureau Europeen de Recherches, Brussels (Belgium).
Feed Use and Feed Conversion Ratios for Livestock in the Member Countries of the European Community.
Staff rept.,
Conrad Caspari, Donald MacLaren, Georgina Hobhouse, Deborah Chamier, and Edmund Neville-Rolfe. Jan 80, 236p
Sponsored in part by Economics, Statistics, and Cooperatives Service, Washington, DC. International Economics Div.

Existence of a common policy on agriculture and a common external tariff suggests a much greater degree of homogeneity in feed use and conversion ratios among member EC countries than is the case. No systematic analysis of livestock production and feeding has been undertaken at the community level. The available national data on feed use vary considerably in quality and detail of their presentation. Information on feed conversion ratios is also quite variable, both between countries and types of livestock. As far as future feed use is concerned, the cyclical nature of hog and poultry markets, in which the system of common support prices plays relatively little direct part, will continue to affect year-to-year demand for compound feeds. Since the prices of milk and beef are subject to direct market support, long run supply of these products and consequently feed demand will be influenced to a much greater extent by decisions taken by the Community's Council of Agricultural Ministers. Absolute improvements in feed conversion ratios for intensively reared stock are, baring an unforeseen technical or genetic breakthrough, unlikely to equal those achieved over the past decade.

PB80-192230 PC A03/MF A01
Louisiana State Univ., Baton Rouge. Dept. of Agricultural Economics and Agribusiness.
Commercial Bulk Grain Handling Operation in Louisiana,
Wayne Gauthier, Harlon Traylor, and Kenneth Wegenhoft. Jun 78, 36p AEA/INFORMATION SER-46

This report presents the results of part of an overall national study designed to evaluate alternative structures for increasing the efficiency of grain marketing in the southern region of the United States.

PB80-192842 PC A03/MF A01
Economics, Statistics, and Cooperatives Service, Washington, DC. International Economics Div.
Impact of Farmer-Owned Wheat Reserve on Total Wheat Stocks and Price.
Staff rept.,
Jerry A. Sharples, and Forrest Holland. Apr 80, 31p
Prepared in cooperation with Purdue Univ., Lafayette, IN. Dept. of Agricultural Economics.

An economic model of ending stock demand is presented and estimated. The model is used to assess the impacts of the farmer-owned wheat reserve for 1977/78 and 1978/79. The results indicate that the farmer-owned wheat reserve provided substantial additional wheat demand and therefore increased wheat prices and producer revenue. The estimation results suggest that the procedures employed in this study may be appropriate for other grains and more complete analysis of the costs and benefits of the farmer-owned reserve.

PB80-197296 PC A05/MF A01
Economics, Statistics, and Cooperatives Service, Washington, DC. National Economics Div.
Structural Equations, Definitions, and Selected Impact Multipliers,
Harry S. Baumes, Jr., and William H. Meyers. Mar 80, 97p

The report presents the behavioral relationships, identities, data definitions, and key first round impact multipliers for the Policy System's Crops Model. The Crops Model consists of three submodels: (1) the Feed Grain Model, (2) the Wheat Model, and (3) the Soybean Model. Each of these models may be solved, when operationalized on a computer, independently or in any combination with the others. The models are linked through the pricing mechanism, and, when solved, determine equilibrium supply, utilization, and price levels simultaneously. The Crops Model is also linked to the livestock sector, domestic macro-economy, and the foreign market exogenously.

PB80-204316 PC A10/MF A01
Bureau Europeen de Recherches, Brussels (Belgium).
Supply and Demand Elasticities for Farm Products in the Member Countries of the European Community.
Staff rept.,
Conrad Caspari, Donald MacLaren, Georgina Hobhouse, and Edmund Neville-Rolfe. Jan 80, 219p
Sponsored in part by Economics, Statistics, and Cooperatives Service, Washington, DC. International Economics Div.

In recent years the value of estimating elasticities of both supply and demand has been increasingly questioned. This is due, in part, to the difficulty in providing reliable elasticity estimates and projections for agricultural commodities on the basis of the highly aggregated and variable statistics which exist in the EC countries. Some experts argue that the income level now reached in the wealthier EC countries results in low income elasticities of demand for food and frequently tend to zero. Given a high level of income, factors such as eating habits, product qualities, and relative price changes will likely play a much greater role in the future. The number of supply models in the EC are quite limited and the product-specific input-output data ideally required for the estimation of a production function is not available. Also, few models are able to incorporate the important influence of agricultural policy on the level of supply.

2C. Agricultural Engineering

PB80-192404 PC A07/MF A01
California Univ., Davis.
A Regional Assessment of the Economic and Environmental Benefits of an Irrigation Scheduling Service.
Final rept.,
Marshall J. English, Gerald L. Horner, Gerald T. Orlob, Joseph Erpenbeck, and Michael Moehlman. Apr 80, 127p EPA-600/2-80-063
Prepared in cooperation with Economics, Statistics, and Cooperatives Service, Washington, DC. Natural Resource Economics Div.

Irrigation scheduling is a technique for systematically determining the proper date and quantity of each irrigation in individual fields. This technique is presently being used by government agencies and private companies in the western United States to assist farmers in planning irrigations. This report describes a case study in which the regional environmental and economic benefits of irrigation scheduling were assessed.

PB80-193477 PC A04/MF A01
California Univ., Davis. Dept. of Land, Air and Water Resources.
Denitrification as Affected by Irrigation Frequency of a Field Soil.
Final rept.,
Dennis E. Rolston, Andrew N. Sharpley, Dianne W. Toy, David L. Hoffman, and Francis E. Broadbent. Apr 80, 75p EPA-600/2-80-066
Grant EPA-R-805550

The influence of irrigation frequency on denitrification was studied on a Yolo loam field profile at Davis, California. Two carbon treatments were also established by using plots with and without incorporated crop residues. Irrigation frequencies of three irrigations per week, one irrigation per week, and one irrigation every two weeks were established on areas cropped with grass. Fertilizer was applied as KNO3 enriched with 15N to 1-sq m plots. Denitrification from the least frequently irrigated treatments was less than that in the most frequently irrigated treatments. Denitrification of NO3(-) fertilizer was simulated using a mathematical model that included transport and plant uptake of water and nitrogen in soil.

PB80-193832 PC A05/MF A01
Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
Improved Water and Fertility Management for Irrigation Systems - Phase 2.
Final rept.,
Paul E. Fischbach. May 80, 100p W80-05517, OWRT-B-037-NEB(1)
Contract DI-14-34-0001-7123

Water and fertility management practices designed to maximize the efficiency of water use were developed for the Sandhills of Nebraska, an area being subjected to intensive irrigation agriculture development. The Sandhills extends over 20,000 square miles with a unique groundwater reservoir that is estimated at over a billion acre-feet, or more than 80 acre-feet of a water per acre, at depths of less than 300 feet in permeable aquifers. Center-pivot irrigation systems that cover 130 acre fields are increasingly being used to produce corn and to irrigate pastures. It is feared that wasteful irrigation practices may lower the water table of the area, creating many unwanted changes. The research on corn growth and irrigation practices was performed on a 15 acre plot at the Sandhills Agriculture Laboratory, Tryon, Nebraska.

PB80-194954 PC A02/MF A01
Structural Engineering Research Centre, Roorkee (India).
Small Capacity Ferrocement Bins.
1977, 19p
Sponsored in part by Agency for International Development, Washington, DC.

Improper methods of storage adopted at present are estimated to account for a loss of about 11 million tons of grain, representing about 10% of the total annual produce. With 70% of the grain stored in villages, the answer is to develop and promote scientific and inexpensive methods of storage at the rural level. This booklet presents complete instructions on how to make rodent and insect proof grain storage bins that are relatively inexpensive to make and easy to repair. The bins can also be coated with bituminous paint and used as water tanks. From the point of view of long term durability, minimum maintenance and special treatment against rodent attack and fire hazard, ferrocement

bins are economical when compared to other types of bins.

2D. Agronomy and Horticulture

AD-A085 592/4 PC **A03**/MF **A01**
Seattle Pacific Univ WA School of Natural and Mathematical Sciences
Planting Guidelines for Seagrasses.
Coastal engineering technical aid rept.,
Ronald C. Phillips. Feb 80, 31p CERC-CETA-80-2
Contract DACW72-79-C-0030

An intensive review was made of the historical and present work on transplanting seagrasses, including eelgrass, turtle grass, shoalgrass, manatee grass, and ditch grass. The best seasons, recommended methods of transplanting, and propagules to use for each species are listed for the coasts of the United States. Some of the more important environmental parameters which directly influence successful transplanting are reviewed. (Author)

PB80-193840 PC **A04**/MF **A01**
New York State Coll. of Agriculture and Life Sciences, Ithaca. Dept. of Agricultural Engineering.
Operational Methods for Analysis of Agricultural Nonpoint Source Pollution.
Technical completion rept. Oct 76-Jan 79,
Douglas A. Haith, and Lawrence J. Tubbs. Mar 80, 65p W80-05515, OWRT-B-055-NY(3)
Contract DI-14-34-0001-7169

Three mathematical models were developed to estimate nutrient and pesticide losses from croplands. The simplest is a set of equations or loading functions designed to estimate daily dissolved and solid-phase nitrogen and phosphorus losses in runoff from large heterogeneous agricultural watersheds. This model was tested using data from a 391-km2 Pennsylvania watershed. The second model predicts edge-of-field dissolved and solid-phase losses of pesticides in runoff. This model includes exponential decay and linear adsorption functions and was tested with data for atrazine losses from two small Georgia catchments.

PB80-195050 PC **A09**/MF **A01**
Maryland Univ., College Park. Water Resources Research Center.
Trace Metal Deposition on Agricultural Crops Near the Chalk Point Generating Station.
Master's thesis,
Paul Joseph Mastradone. Nov 79, 178p SR-14, PPSP-CPCTP-33

The objectives of this investigation were (1) to determine the effects of major technological changes in electric power generation on the release of heavy metals into the environment (2) to examine the distribution and deposition of several heavy metals in the agricultural environment near Chalk Point and (3) to determine the effects of the deposition on the concentrations of these metals associated with corn (Zea mays) and soybeans (Glycine max) grown in the region.

2F. Forestry

PB80-189830 PC **A02**/MF **A01**
Northeastern Forest Experiment Station, Broomall, PA.
Site Index Prediction Tables for Oak in Northwestern West Virginia.
Forest Service research paper (Final),
Neil Lamson. 1980, 9p NEFES/80-73, FSRP-NE-462

Prediction tables for even-aged stands of white, chestnut, northern red, scarlet, and black oaks can be used to estimate the site index of forest land in 13 counties of northwestern West Virginia. The half width of the 95 percent confidence interval of the predicted site index is included; it can be used to determine the number of sample trees necessary to attain given levels of precision, or to determine the precision of a site index prediction for a known number of sample trees.

PB80-192420 PC **A03**/MF **A01**
Northeastern Forest Experiment Station, Broomall, PA.
A Guide to Hardwood Log Grading.
Forest Service general technical rept. (Final),
Everett D. Rast, David L. Sonderman, and Glenn L. Gammon. 1973, 37p NEFES/80-74, FSGTR-NE-1

The report, a guide to hardwood log grading (Revised) was developed as a teaching aid and field reference in grading hardwood logs. The study outlines basic principles and gives detailed practical applications, with illustrations, in grading hardwood logs. It also includes standards for various use classes.

PB80-192438 PC **A04**/MF **A01**
Northeastern Forest Experiment Station, Broomall, PA.
Nineteen Seventy-Four (1974) at the Northeastern Station.
Forest Service general technical rept. (Final). 1975, 52p NEFES/80-80, FSGTR-NE-18

The report highlights research activities and accomplishments by the Experiment Station in 1974, including an annotated list of publications.

PB80-192958 PC **A03**/MF **A01**
Northeastern Forest Experiment Station, Broomall, PA.
The Allegheny Hardwood Forests of Pennsylvania.
Forest Service general technical rept. (Final),
David A. Marquis. 1975, 37p NEFES/80-77, FSGTR-NE-15

This article describes the changes that have occurred in the Allegheny hardwood forests of northwestern Pennsylvania from the days of the Indian through the era of white settlement and industrial development up to the present time. Both the problems now faced in regenerating new stands and the bounty of timber and deer now obtained from these forests had their origin in events that occurred many years ago.

PB80-194764 PC **A02**/MF **A01**
Northeastern Forest Experiment Station, Broomall, PA.
Interim Guide to Regeneration of Allegheny Hardwoods.
Forest Service general technical rept. (Final),
David A. Marquis, Ted J. Grisez, John C. Bjorkbom, and Benjamin A. Roach. 1975, 20p NEFES/80-81, FSGTR-NE-19

Regeneration of Allegheny hardwoods is difficult to obtain because of excessive deer browsing on tree seedlings. Density of advance seedlings, density of competing plants, soil drainage, and the importance of esthetic and recreation uses affect the choice of silvicultural system and cutting procedure for obtaining satisfactory regeneration. In this paper, the authors provide guides needed for evaluating the regeneration potential and prescribing the most appropriate treatment for cherry-maple stands on the Allegheny Plateau of Pennsylvania and New York.

PB80-194780 PC **A02**/MF **A01**
Northeastern Forest Experiment Station, Broomall, PA.
How to Predict Lumber-Grade Yields for Graded Trees.
General technical rept. (Final),
Leland F. Hanks. 1976, 16p NEFES/80-82, FSGTR-NE-20

A procedure is shown for developing lumber-grade yields to be used with the USDA Forest Service Hardwood Tree Grades for Factory Lumber. Yield development is followed from the time of selecting trees, through sawing the logs and grading the lumber, to the development of predicted lumber grade yields. By following this procedure, a sawmill operator can develop yields that are representative of both his sawmill and the local timber.

PB80-194806 PC **A02**/MF **A01**
Northeastern Forest Experiment Station, Broomall, PA.
Summaries of Some Silvical Characteristics of Several Appalachian Hardwood Trees.
Forest Service general technical rept. (Final),
George R. Trimble, Jr. 1975, 10p NEFES/80-78, FSGTR-NE-16

The author summarizes the following silvicultural characteristics of a number of Appalachian hardwood species: shade tolerance, susceptibility to epicormic branching, susceptibility to frost damage, diameter-growth rates, and seed dormancy in the forest floor.

PB80-194814 PC **A02**/MF **A01**
Northeastern Forest Experiment Station, Broomall, PA.
Scheduling Timber Cutting for Sustained Yield of Wood Products and Wildlife.
Forest Service general technical rept. (Final),
Benjamin A. Roach. 1974, 18p NEFES/80-76, FSGTR-NE-14

Maintaining stable wildlife populations throughout eastern hardwood forests will require adjusting and regulating timber age classes by much smaller units of land (approximating the home ranges of the species involved) than would be needed for sustained yield of timber alone. The key to successful regulation for combined timber and wildlife production, with minimum impact on costs and timber yields, is long-term planning of cutting schedules and comparison of yields under alternative schedules for small units of land.

PB80-195324 PC **A04**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. National Economics Div.
International Forestry in the U. S. Department of Agriculture.
Staff rept.,
Robert K. Winters. Jan 80, 66p

The U.S. Forest Service and schools of forestry developed principles of forest and range conservation, regeneration, multiple use, and sustained yields as a means of restoring and maintaining U.S. forest productivity and protecting land and water resources. Since 1940 the U.S. Forest Service has been continuously providing technical assistance to other countries in an effort to transplant these principles and assist in the establishment of viable national forestry programs. The progress and problems of this effort are seen through the eyes of the participants.

PB80-198310 PC **A02**/MF **A01**
Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.
Carnivora Food Habits and Habitat Use in Ponderosa Pine Forests.
Forest Service research paper (Final),
Frank J. Turkowski. May 80, 15p FSRP-RM-215

Major food items of carnivores on the Beaver Creek Watershed (with percentage of scats in which each was found) were mammals 50%, birds 6%, reptiles 3%, arthropods 37%, and plants 60%. Although habitat manipulation influenced carnivore use of the treated watersheds, the modifications were not harmful to most carnivore species.

SRO-1015-T4 PC **A02**/MF **A01**
Georgia Univ., Athens. School of Forest Resources.
Some Seasonal Carbohydrate Fluctuations in Coppiced Rootstocks of Platanus Occidentalis.
M. R. Blum, and K. Steinbeck. 11p
Contract EG-77-S-09-1015
Thesis.

Carbohydrate concentrations were determined in 11-year-old rootstocks of American sycamore (Platanus occidentalis) which had been coppiced on one- or two-year rotations for the preceding eight years. Sixty rootstocks were destructively sampled periodically between September 1976 and April 1977. Root starch concentrations declined erratically from 21 percent of dry weight in autumn to 14 percent by late April. Sugar levels rose from 1.5 percent in autumn to 5 percent in winter and declined to 3 percent in spring. Considerable variation in root starch levels from tree to tree was observed, and differences in starch and sugar concentrations between rootstocks coppiced on an annual or biannual basis were unimportant. These data suggest that while differences in above-ground biomass yields encountered in short rotation coppice forestry are not due to differ-

ences in rootstocks carbohydrate concentrations, the total quantity of reserve carbohydrate stored in a root system is probably a controlling factor for sprout regrowth potential. (ERA citation 05:022012)

3. ASTRONOMY AND ASTROPHYSICS

3B. Astrophysics

AD-A085 390/3 PC **A03**/MF **A01**
Colorado Univ At Boulder
Convective Instability When the Temperature Gradient and Rotation Vector are Oblique to Gravity. 1. Fluids without Diffusion,
David H. Hathaway, Peter A. Gilman, and Juri Toomre. 8 Dec 78, 30p AFGL-TR-80-0103
Contracts F19628-77-C-0104, NAS8-31958
Pub. in Geophysical and Astrophysical Fluid Dynamics, v13 p289-316 1979. Sponsored in part by Grants NGL-06-003-052 and NGL-06-003-057.

No abstract available.

ANL-Trans-1184 MF **A01**
Study of a Chemical Analyzer of the Condensables in the Atmosphere of Venus by Attenuated Total IR-Reflection.
J. E. Blamont, G. Israel, F. Goutail, F. Letki, and G. Souchon. Apr 80, 48p
Contract W-31-109-ENG-38
C Service d'Aeronomie, Center National de la Recherche Scientifique (France) report No. 411-G-79, December 1979.
Microfiche copies only.

Results of the development of a Venusian aerosol analyzer and laboratory measurements made with it are presented. The scientific method developed for the detection and analysis of aerosols in the atmosphere of Venus is described. (ERA citation 05:023171)

HU-TFT-79-19 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Instanton Effects in the Equation of State for Dense Neutron Star Matter.
C. G. Kaelliman. 1979, 12p
U.S. Sales Only.

Vacuum fluctuation effects in QCD due to instantons are considered in dense neutron star matter. In the density region of insterest to neutron star cores we find a density dependens approximately nsub(B)sup(-1/3), in contrast to a result by Shuryak, approximately nsub(B)sup. (Atomindex citation 11:495829)

INIS-mf-5377 PC **A08**/MF **A01**
Bonn Univ. (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet.
Polarization of the Decimeter Radiation and the Magnetic Field of Jupiter.
J. Neidhoefer. 27 Oct 77, 174p
In German.Thesis.
U.S. Sales Only.

In the framework of polarization measurements with the newly developed Double-Channel-Correlation-System, there were measurements conducted of the decimeter radiation of Jupiter at wavelengths of 11 and 18 cm with the 100 m telescope of the MPIFR. The operating mode, the construction, influences of errors and their elimination during operation are described for such a receiving system. The most important particular components are investigated including their limits of performance. Measurement of antenna properties of the Effelsberg-telescope are presented at three wavelengths (18, 11 and 3.3 cm) including high-sensitivity antenna diagrams for all Stokes parameters. (Atomindex citation 11:498312)

INIS-mf-5379 MF **A01**
Bonn Univ. (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet.
Discussion of the Spectra of the S-Component Derived from Measurements with the 10 M Telescope at Stockert.
P. Steffen. 2 Feb 78, 108p
In German.Thesis.
U.S. Sales Only. Microfiche copies only.

In the present work the spectrum of the S-component radiation is investigated in the lower cm and dm wave region. In particular the data at lambda = 8.6 mm gained at the 10-m mirror on the Stockert are used for supplementing other routine observations of the sun. The influence of the form of the spectrum in the mm wave region on the flare activity of active areas is considered together with corresponding coronal condensations with a look at possible flare predictions. (Atomindex citation 11:498361)

N80-26228/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
The Discovery of Optical Emission from the SNR G 126.2 + 1.6.
W. P. Blair, R. P. Kirshner, T. R. Gull, D. L. Sawyer, and R. A. R. Parker. May 80, 18p NASA-TM-80708

Interference filter photographs were used to identify an arc of nebulosity that is coincident with the radio contours of the galactic supernova remnant G 126.2 + 1.6. Spectrophotometry of the filament shows that the emission line spectrum matches the spectra of other galactic supernova remnants. In particular, the arc shows the usual strong SII, and NII emission lines seen in other remnants and unusually strong OII emission as seen in a few remnants. The spectrum can be adequately matched by a shock of velocity near 100 km/s in an interstellar cloud of density 3. If the SNR is at a distance of 4.5 kpc as indicated by the radio signal-D relation, then the observed pressure in the filament requires an initial energy near 4 x 10 to the 51st power (d/4.5 kpc) to the 3rd power ergs.

N80-26229/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
Synchrotron Cooling and Annihilation of an E(+)-E(-) Plasma: The Radiation Mechanism for the March 5, 1979 Transient.
R. Ramaty, R. E. Lingenfelter, and R. W. Bussard. Mar 80, 21p NASA-TM-80674

Positron-electron pair radiation is examined as a mechanism that could be responsible for the impulsive phase emission of the March 5, 1979 transient. Synchrotron cooling and subsequent annihilation of the pairs can account for the energy spectrum, the very high brightness, and the approximately 0.4 MeV feature observed from this transient, whose source is likely to be a neutron star in the supernova remnant N49 in the Large Magellanic Cloud. In this model, the observed radiation is produced in the skin layer of a hot, radiation dominated pair atmosphere, probably confined to the vicinity of the neutron star by a strong magnetic field. The width of this layer is only about 0.1 mm. In this layer, approximately 10 to the 12th power generations of pairs are formed (by photon-photon collisions), cooled and annihilated during the approximately 0.15 sec duration of the impulsive phase. The very large burst energy implied by the distance of the Large Megellanic Cloud, and its very rapid release, are unsolved problems. Nonetheless, the possibility of neutron star vibrations, which could transport the energy coherently to the surface, heat the atmosphere mechanically to a hot, pair-producing temperature, and have a characteristic damping time roughly equal to the duration of the impulsive phase are addressed.

N80-26230/6 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
The Goddard Program of gamma Ray Transient Astronomy.
T. L. Cline, U. D. Desai, and B. J. Teegarden. Mar 80, 30p NASA-TM-80675
Submitted for Publication. Presented at the Symp. And Workshop on Cosmic gamma Ray Bursts, Toulouse, France, 26 Nov. 1979.

Gamma ray burst studies are reviewed. The past results, present status and future expectations are outlined regarding endeavors using experiments on balloons, IMP-8 and -7, OGO-3, ISEE-1 and -3, Helios-2, Solar Maximum Mission, the Einstein Observatory, Solar Polar and the Gamma Ray Observatory, and with the interplanetary gamma ray burst networks, to which some of these spacecraft sensors contribute. Additional emphasis is given to the recent discovery of a new type of gamma ray transient, detected on 1979 March 5.

N80-26231/4 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
Observations of Electron Gyroharmonic Waves and the Structure of the Io Torus.
T. J. Birmingham, J. K. Alexander, M. D. Desch, R. F. Hubbard, and B. M. Pedersen. May 80, 34p NASA-TM-80696
Submitted for Publication.

Narrow-banded emissions were observed by the Planetary Radio Astronomy experiment on the Voyager 1 spacecraft as it traversed the Io plasma torus. These waves occur between harmonics of the electron gyrofrequency and are the Jovian analogue of electrostatic emissions observed and theoretically studied for the terrestrial magnetosphere. The observed frequencies always include the component near the upper hybrid resonant frequency, (fuhr) but the distribution of the other observed emissions varies in a systematic way with position in the torus. A refined model of the electron density variation, based on identification of the fuhr line, is included. Spectra of the observed waves are analyzed in terms of the linear instability of an electron distribution function consisting of isotropic cold electrons and hot losscone electrons. The positioning of the observed auxiliary harmonics with respect to fuhr is shown to be an indicator of the cold to hot temperature ratio. It is concluded that this ratio increases systematically by an overall factor of perhaps 4 or 5 between the inner and outer portions of the torus.

N80-26235/5 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
The 1979 X-Ray Outburst of Cen X-4.
L. J. Kaluzienski, S. S. Holt, and J. H. Swank. May 80, 25p NASA-TM-80694
Submitted for Publication.

X-ray observations of the first major outburst (since its initial discovery in 1969) of the 'classical' transient X-ray source Cen X-4 were obtained with the Ariel 5 All-Sky Monitor. The flare light curve exhibits a double-peaked maximum at a level of approximately 4 times the Crab nebula, and its duration and characteristic decay time scale are the shortest yet observed from the class of 'soft' X-ray transients. A total X-ray output of approximately 3 x 10 to the 43rd power ergs, a factor of approximately 20 less than that of the 1969 outburst is estimated. In addition, evidence is found for a regular modulation of the flux during the decline phase at a period of 8.2 plus or minus 0.2 hours. The existing data are consistent with a source model involving episodic mass exchange from a late-type dwarf onto a neutron star comparison in a relatively close binary system.

N80-26236/3 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
The Evolution of Supernova Remnants in Different Galactic Environments, and Its Effects on Supernova Statistics.
M. Kafatos, S. Sofia, F. Bruhweiler, and T. R. Gull. May 80, 39p NASA-TM-80707

Examination of the interaction between supernova (SN) ejecta and the various environments in which the explosive event might occur shows that only a small fraction of the many SNs produce observable supernova remnants (SNRs). This fraction, which is found to depend weakly upon the lower mass limit of the SN progenitors, and more strongly on the specfic characteristics of the associated interstellar medium, decreases from approximately 15 percent near the galctic center to 10 percent at Rgal approximately 10 kpc and drops nearly to zero for Rgal 15 kpc. Generally, whether a SNR is dectectable is determined by the density of the ambient interstellar medium in which it is embeeede. The presence of large, low density cavities arpund stellar associations due to the combined effects of stellar winds and supernova shells strongly suggests that a large portion of the detectable SNRs have runway stars as their progenitors.

These results explain the differences between the substantially larger SN rates in the galaxy derived both from pulsar statistics and from observations of SN events in external galaxies, when compared to the substanially smaller SN rates derived form galactic SNR statistics.

N80-26240/5 PC **A14/MF A01**
Science Applications, Inc., Pasadena, CA. Planetary Science Inst.
Viking Orbiter Stereo Imaging Catalog.
Final Report.
K. R. Blasius, A. V. Vetrone, and M. D. Martin.
Jun 80, 303p NASA-CR-3277
Contracts NASW-3208, JPL-954149

The extremely long missions of the two Viking Orbiter spacecraft produced a wealth of photos of surface features. Many of which can be used to form stereo images allowing the earth-bound student of Mars to examine the subject in 3-D. This catalog is a technical guide to the use of stereo coverage within the complex Viking imaging data set. Since that data set is still growing (January, 1980, about 3 1/2 years after the mission began), a second edition of this catalog is planned with completion expected about November, 1980.

N80-26242/1 PC **A07/MF A01**
Illinois Univ., Urbana.
Rocket Observations of Solar Radiation During the Eclipse of 26 February 1979.
H. M. Bliss, and L. G. Smith. 1 May 80, 129p
NASA-CR-163211, UILU-ENG-80-2502
Contract NGR-14-005-181

Three Nike Tomahawk rockets were launched in Red Lake, Ontario, one previous to, and two during, the total eclipse of the Sun, for the purpose of studying the atmosphere and its interaction with solar radiation. The method and preliminary results of three experiments that were used to measure solar radiation in the X-ray, Lyman-alpha, and visible parts of the spectrum are described. The instrumentation designed for this investigation is discussed as well as post-flight data processing techniques. The retrieved data were processed to some extent to verify that a valid representation of the solar radiation was obtained. The Lyman-alpha experiment yielded very good results, and preliminary data are included. The visible radiation experiment served as support for the other experiments and also functioned well. Due to a high level of energetic particles during the eclipse, the X-ray data were contaminated and are not presented. However, satellite observations indicate no appreciable level of X-rays from the Sun during the time of the eclipse.

N80-26243/9 PC **A02/MF A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Aspects of Solar Wind Theories.
R. A. Medrano-b.. Dec 79, 25p INPE 1636-RPE/095
Revised.

A critical review of past and present theories is presented in order to identify the main difficulties that should be surmounted by any modern theoretical model to achieve satisfactory results. It is found that the major difficulties are insufficient knowledge about the damping of the magnetohydrodynamic waves to heat the solar wind protons and about electron heat conduction flux density for the collisonless interplanetary plasma. More experimental information about the boundary conditions of the low corona, which became more important after the coronal holes were identified as probable sources of the solar wind, should be obtained.

N80-26251/2 PC **A02/MF A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
Is the Remnant of SN1006 Crab-Like.
R. H. Becker, A. E. Szymkowiak, E. A. Boldt, S. S. Holt, and P. J. Serlemitsos. May 80, 14p
NASA-TM-80689
Submitted for Publication.

The solid state spectrometer on the Einstein Observatory and the GSFC cosmic X-ray spectrometer on OSO-8 observed the X-ray spectrum of SN1006. The data can be well-represented by a power-law model with alpha = 1.2, similar to the spectrum of the Crab nebula. This is in contrast to the radio and X-ray maps of SN1006 which show a shell structure more typical of SNR with thermal X-ray emission. The X-ray spectrum is suggestive of nonthermal synchrotron emission, raising the possibility that the remnant of SN1006 contains a source of relativistic electrons.

N80-26252/0 PC **A02/MF A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
High Resolution Spectroscopy of Two gamma-Ray Bursts in November 1978.
B. J. Teegarden, and T. L. Cline. Oct 79, 16p
NASA-TM-80575
Submitted for Publication.

The first results from the ISSEE-3 radiatively colled germanium gammray burst spectrometer are presented. Spectra and time histories from two events on the 1978 November 4 and 1978 November 19 are given. A significant difference in the continuum spectra for the two events was observed. Evidence is presented for two spectral features in the features in the November 19 events, a broad one at approximately 420 key KeV and a narrower one at 740 KeV with a suggestion of an accompanying high energy tail.

N80-26254/6 PC **A02/MF A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Nuclear gamma Ray Lines from Supernovae.
J. O. D. Jardim. Jan 80, 14p INPE-1665-RPE/105
Revised.

From theoretical observations of the behavior of gamma ray lines fluxes occurring after a supernova explosion, the 1.156 and 0.847 MeV lines are seen to be the most likely to be observed. The 1.156 MeV line was previously observed by other investigators. Observations are reported of the 0.847 MeV line, and 1,332, 1.173 and 0.059 MeV lines using a Ge(Li) telescope aboard a stratospheric balloon which was flown in Brazil in 1977. The observation using a NaI(Tl) detector of a line in the energy interval 1.5 - 1.6 MeV is also reported. It may be due to O18 (p, p prime) O18* reaction.

PB80-197635 PC **A08/MF A01**
National Geophysical and Solar-Terrestrial Data Center, Boulder, CO.
Solar-Geophysical Data Number 428, April 1980. Part I (Prompt Reports). Data for March 1980, February 1980.
Apr 80, 171p SGD-428-PT-1, NOAA-80051907
See also Part 2, PB80-197643, and Part 1, PB80-186141.

In addition to an index for 1979-1980, this prompt report provides data for March 1980 on: alert periods, daily solar indices, solar flares, solar radio emission, spacecraft observations, solar wind measurements, inferred interplanetary magnetic field polarities, mean solar magnetic field, coronal holes and Boulder Geomagnetic Substorm Log. It also provides data for February 1980 on: daily solar activity centers, sudden ionospheric disturbances, solar radio emission, cosmic rays, geomagnetic indices and radio propagation indices. Late data included in this issue presents cosmic rays January 1980, geomagnetic indices January 1980 and daily solar activity centers for late January 1980 and December 1979.

PB80-197643 PC **A03/MF A01**
National Geophysical and Solar-Terrestrial Data Center, Boulder, CO.
Solar-Geophysical Data Number 428, April 1980. Part II (Comprehensive Reports). Data for October 1979.
Apr 80, 36p SGD-428-PT-2, NOAA-80051908
See also Part 1, PB80-197635, and PB80-186158.

In addition to an index for 1979-1980, this issue of comprehensive reports provides data for October 1979 on: solar radio emission, energetic solar particles and plasma, and solar x-ray radiation. Solar flare data are now over a year delayed from date of observation, rather than the usual six months. A delay in the final listing of solar flare data also delays the Daily Flare Index, the Regional Flare Index and the Abbreviated Calendar Record.

4. ATMOSPHERIC SCIENCES

4A. Atmospheric Physics

AD-A085 128/7 PC **A11/MF A01**
California Univ Livermore Lawrence Livermore Lab
Potential Environmental Effects of Aircraft Emissions.
Final rept.,
F. M. Luther, J. S. Chang, W. H. Duewer, J. E. Penner, and R. L. Tarp. 15 Oct 79, 234p UCRL-52861, FAA/EE-79-23
Contracts W-7405-eng-48, DOT-FA79WAI-034

An assessment is provided of the potential environmental effects of fleets of subsonic, supersonic, and hypersonic aircraft. A general discussion of photochemical and transport modeling techniques is included along with a description of the LLL one-dimensional transport-kinetics model that was used in the assessment. Model simulations of the natural and perturbed stratosphere are used to compare theory with observations as a means of verification of model processes. A review is provided of engine emission indexes and 1990 fleet projections. Assessments of the potential effects of subsonic and supersonic aircraft fleets indicate a small increase in total ozone. However, the change in total ozone is the net difference between regions of ozone increase (in the lower stratosphere and upper troposphere) and ozone decrease (in the upper stratosphere). The percent change in the local ozone concentration is much larger than the change in total ozone. The effect of a proposed hydrogen fueled hypersonic transport fleet is a small reduction in total ozone. A study is made of the effect on these results of uncertainties in chemical rate coefficients, speculative chemical reactions, temperature feedback, hydrostatic adjustment, and various model parameters. The potential effect on ozone of aircraft emissions is compared with potential changes due to other anthropogenic perturbations. (Author)

AD-A085 339/0 PC **A03/MF A01**
Boston Coll Chestnut Hill MA Space Data Analysis Lab
Theoretical Studies of Atmospheric Tides.
Jeffrey M. Forbes, and Henry B. Garrett. 4 Oct 78, 33p AFOSR-TR-80-0369
Contract N00014-78-C-0267, Grant AFOSR-77-3223
Pub. in Reviews of Geophysics and Space Physics, v17 n8 p1951-1981 Nov 79.

No abstract available.

AD-A085 345/7 PC **A03/MF A01**
New Mexico Inst of Mining and Technology Socorro Research and Development Div
The Cloud Effects Phase of the Laser Induced Lightning Investigation.
Final rept.,
C. B. Moore, D. N. Holden, and James Griswold.
Apr 80, 48p AFOSR-TR-80-0454
Grant AFOSR-78-3722

A mountain-top laboratory facility has been established in central New Mexico for studies of the effects of high powered lasers on the ionization of the air and on the possible triggering of lightning from thunderclouds overhead. A net of electric field meters and another one with television cameras and video recorders have been established for determinations of the nature of normal and of triggered lightning in the operational area. A special electric field meter is carried beneath a captive balloon to heights of about 600 m above the facility and measured the electric fields there for the entire life of several storms. The field strengths aloft were as much as 6 fold greater than those observed at the surface; the field changes after lightning did not show the characteristic reversal caused by the corona produced space charge and the field after lightning recovered with a linear increase until lightning occurred again. Monitoring of electric fields aloft therefore provide a better choice of the optimum times for a lightning triggering attempt. As part of the 1979 field work, lightning discharges were induced twice by the use of

wire-trailing, French rockets fired into thunderclouds over the Magdalena Mountains. As a result, interesting measurements of the breakdown proces were obtained using AF Weapons Laboratory electromagnetic sensors: Magnetic field derivative signals in excess of 17 Teslas/second were observed in one of the triggered discharges.

AD-A085 373/9 PC **A02**/MF **A01**
Hill (Robert D) Montecito CA
Atmospheric Nitrogen Fixation by Lightning.
Robert D. Hill, R. G. Rinker, and H. Dale Wilson. 21 May 79, 15p
Contract N00014-80-C-0293, Grant NSF-ATM77-17568
Pub. in Jnl. of the Atmospheric Sciences, v37 n1 p179-192 Jan 80.

No abstract available.

AD-A085 389/5 PC **A02**/MF **A01**
Air Force Geophysics Lab Hanscom AFB MA
A Dynamical Model for the Onset of Magnetospheric Substorms,
P. L. Rothwell, and G. K. Yates. 1980, 23p Rept no. AFGL-TR-80-0170
Pub. in Dynamics of the Magnetosphere, p497-518 1978.

No abstract available.

AD-A085 472/9 PC **A03**/MF **A01**
Naval Research Lab Washington DC
PLUMEX I: Coincident Radar and Rocket Observations of Equatorial Spread-F.
Memorandum rept.,
E. P. Szuszczewicz, R. T. Tsunoda, R. Narcisi, and J. C. Holmes. 17 Mar 80, 30p NRL-MR-4201, AD-E000 430

Coordinated measurements of equatorial spread-F conducted during July 1979 at the Kwajalein Atoll have yielded the first definitive space and time coincident radar and rocket observations of small scale irregularities and large scale plasma depletions. The results have shown that: (a) Within a large-scale topside F-layer depletion radar backscatter energy is at a level much lower than that observed on the depletion's topside. The same is true of 'in situ' irregularity observations, and (b) Ion composition within a topside depletion can provide signatures of its bottomside source domain and estimates of average maximum vertical drift velocity. For long-lived depletions, molecularion signatures (NO(+) and O2(+)) can be lost while bottomside levels of N(+) can be maintained when O(+) approximately equals N sub e much greater than NO(+) + O2(+), and finally, (c) Large scale fluctuations of O(+) accompanied by a near-constant level of NO(+) and O2(+) on the bottomside F-layer gradient suggests that neutral atmospheric turbulence is not a major source for bottomside ionospheric plasma irregularities.

AD-A085 532/0 PC **A02**/MF **A01**
Air Force Geophysics Lab Hanscom AFB MA
Mesospheric Density Variability,
C. R. Philbrick, E. A. Murphy, S. P. Zimmerman, E. T. Fletcher, Jr., and R. O. Olsen. 1980, 7p Rept no. AFGL-TR-80-0158
Pub. in COSPAR Space Research, v20 p79-82 1980.

No abstract available.

AD-A085 533/8 PC **A02**/MF **A01**
Air Force Geophysics Lab Hanscom AFB MA
Ion Production in the D-Region,
William Swider. 1980, 20p Rept no. AFGL-TR-80-0156
Pub. in Solar-Terrestrial Proceedings, v2 p599-616 n. d.

No abstract available.

AD-A085 578/3 PC **A06**/MF **A01**
Lockheed Missiles and Space Co Inc Palo Alto CA
Palo Alto Research Lab
Ground-Based Photometric Measurements HAES Program Support.
Interim rept. 12 Sep 77-31 Jan 79,
R. D. Sears. 31 Jan 79, 104p DNA-4975Z, AD-E300 795
Contract DNA001-77-C-0329

Ground-based photometric measurements of auroral and airglow intensities, motions, and spatial and temporal PSD's (power spectral densities) were made at Chatanika, Alaska in support of DNA/AFGL rocket and satellite experiments during the interval September 1977 through January 1979. The latitudinal variations of auroral, airglow,and ionospheric parameters were monitored using a multicolor, meridional scanning photometer. Horizontal motions and scale sizes were monitored using two multiple beam photometers. Data obtained in support of four DNA/AFGL rocket experiments, Field Widened Interferometer, WIDEBAND Multi, SWIR/SWIR/TMA, and EXCEDE II, are presented herein. Data synopsis sheets describing the data obtained for a number of WIDEBAND satellite passes are also included.

AD-A085 724/3 PC **A06**/MF **A01**
Lockheed Missiles and Space Co Inc Palo Alto CA
Palo Alto Research Lab
Fluorescence Experiment and Auroral Data Evaluation to Improve Prediction of Nuclear Atmospheric Infrared Background.
Final rept. 2 Feb 78-28 Feb 79,
J. B. Kumer, and T. C. James. 28 Feb 79, 116p LMSC/D673384, DNA-4906F, AD-E300 789
Contract DNA001-78-C-0082

The report documents coordinated laboratory and data evaluation research efforts which are relevant to the DNA program for developing capability to predict nuclear enhanced atmospheric infrared background radiance. The laboratory effort involves the use of a dye laser pumped LiNb03 optical parametric oscillator in order to produce a tunable source of intense 2.7 micron light for the purpose of laboratory simulation of the infrared effects of solar or nuclear illumination of the atmosphere. The source is used to excite the specie CO2(101) which can re-radiate at 2.7 micron via 101 yields 000 or at 4.3 micron via 101 yields 100, the latter process is predicted to be a major nuclear effect at 4.3 micron under certain conditions since theoretically it is predicted to occur more often than the former by ratio 20;1. A primary purpose of our laboratory effort was to confirm this prediction, our initial results place a lower limit of 10:1 on the branching ratio. This low precision result can be enhanced by utilizing simple techniques that were not within the scope of the initial effort, namely by the use of (1) well documented techniques for improving laser frequency stability, (2) a cooled 2.7 micron filter mounted in the detector dewar, (3) a multiple pass fluorescence cell, and (4) faster electronics for recording the 2.7 micron signal. Implementation of these techniques should improve the precision of the measurement by more than 2 orders of magnitude. Additionally, the initial effort has demonstrated the applicability of the laser source and peripheral vacuum and electronic equipment for the high precision measurements of quenching and vibration transfer rate coefficients.

AD-A085 734/2 PC **A03**/MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
Bimodal Size Distribution Models for Fogs at Meppen, Germany.
Technical rept. Feb-Mar 78,
Louis D. Ducan, and Richard D. H. Low. Apr 80, 44p Rept no. ERADCOM/ASL-TR-0056
Errata sheet inserted.

Models have been fitted to fog data collected at Meppen, Federal Republic of Germany, during February and March 1978. These models are formulated as the sum of two gamma distributions in order to preserve the basic shape characteristics of the observed size distributions--in particular, their bimodal characteristics. The models accept visibility as an input and generate a size distribution consistent wtih this input. Six parameters are required to determine a model size distribution. It is shown that constants can be assigned to two of these parameters. Algorithms, based upon curve fits, are developed for computing the other parameters as a function of visibility. Tables and graphs are presented which demonstrate the capability of the model to reproduce the features of the measured drop-size distributions; also included are comparisons of the derived quantities of liquid water content and infrared extinction coefficients. (Author)

AD-A085 781/3 PC **A02**/MF **A01**
Logicon Inc Lexington MA
Analytic Representation of the Jacchia 1977 Model Atmosphere,
James N. Bass. 25 Jan 80, 16p SCIENTIFIC-2, AFGL-TR-80-0037
Contract F19628-78-C-0209

Modified Jacchia-Walker temperature profiles are developed to accurately represent the Jacchia 1977 temperature profiles above 125 km. The diffusive equilibrium equations are analytically integrable for these profiles, greatly reducing the need for tabular storage of solutions. (Author)

AD-A085 794/6 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
R-Branch Head of the V3 Band of CO2 at Elevated Temperatures.
Journal article,
Alan S. Pine, and Guido Guelachvili. 17 May 79, 8p JA-4986, ESD-TR-80-6
Contract F19628-80-C-0002
Pub. in Jnl. of Molecular Spectroscopy, v79 p84-89 1980.

No abstract available.

CONF-800327-4 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Comparison of Observed and Predicted Normalized Air Concentrations for 56-M Releases of Fluorescein Particles.
C. W. Miller, C. A. Little, and S. J. Cotter. 1980, 17p
Contract W-7405-ENG-26
Joint conference on applications of air pollution meteorology, New Orleans, LA, USA, 24 Mar 1980.

Centerline ground-level normalized air concentration measurements made at Hanford, Washington, for the short-term release of fluorescein particles from a height of 56 m were compared with a Gaussian plume atmospheric dispersion model using two different sets of dispersion parameters and two different methods of classifying atmospheric stability. The ratio of the predicted air concentration to the observed air concentration is strongly dependent on the downwind distance being considered. All four methods have a tendency to underpredict near the source, sometimes by many orders of magnitude, and to overpredict at the farthest distances considered (12.8 km). Such a tendency must be taken into account when assessing the impact (on man) of short-term pollutant releases to the atmosphere. In general, the results of this study highlight the difficulty of choosing a set of dispersion parameters and estimating atmospheric stability for use in assessment activities. These results also show, however, that such specification is important in determining the accuracy of Gaussian plume atmospheric dispersion model predictions. (ERA citation 05:021134)

LA-7842-T PC **A12**/MF **A01**
EG and G, Inc., Los Alamos, NM.
Plasma Boundary Layer and Magnetopause Layer of the Earth's Magnetosphere.
T. E. Eastman. Jun 79, 264p
Contract W-7405-ENG-36
Thesis.

IMP 6 observations of the plasma boundary layer (PBL) and magnetopause layer (MPL) of the earth's magnetosphere indicate that plasma in the low-latitude portion of the PBL is supplied primarily by direct transport of magnetosheath plasma across the MPL and that this transport process is relatively widespread over the entire sunward magnetospheric boundary. (ERA citation 05:021377)

N80-25964/1 PC **A08**/MF **A01**
Illinois Univ., Urbana.
Rocket Measuremnts of Electron Temperature in the E Region.
R. K. Zimmerman, Jr., and L. G. Smith. 1 Apr 80, 173p NASA-CR-163210, UILU-ENG-80-2501
Contract NGR-14-005-181

The rocket borne equipment, experimental method, and data reduction techniques used in the measurement of electron temperature in the E region are fully described. Electron temperature profiles from one daytime equatorial flight and two

nighttime midlatitude flights are discussed. The last of these three flights, Nike Apache 14.533, showed elevated E region temperatures which are interpreted as the heating effect of a stable auroral red arc.

N80-25965/8 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
NASA-JSC Ozone Observations for Validation of Nimbus 7-LIMS Data.
D. E. Robbins. Apr 80, 44p NASA-TM-58227, JSC-16498

A series of balloon flights undertaken to validate data received from the limb infrared monitor of the stratosphere instrument aboard the Nimbus 7 satellite is discussed. Ozone data profiles, which included altitude, pressure, and mixing ratio, obtained during both ascent and descent of the balloons are reported. The measurement concept, instrumental uncertainties, and temporal variations observed for several time periods are discussed.

N80-25967/4 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
Initial Geomagnetic Field Model from Magsat.
R. A. Langel, R. H. Estes, G. D. Mead, E. B. Fabiano, and E. R. Lancaster. Apr 80, 19p NASA-TM-80679
Submitted for Publication.

Magsat data from magnetically quiet days were used to derive a thirteenth degree and order spherical harmonic geomagnetic field model, MGST(3/80). The model utilized both scalar and vector data and fit that data with standard deviations of 8, 52, 55 and 97 nT for the scalar magnitude, B sub r, B sub theta and B sub phi respectively. When compared with earlier models, the Earth's dipole moment continues to decrease at a rate of about 26 nT/year. Evaluation of earlier models with Magsat data shows that the scalar field at the Magsat epoch is best predicted by the POGO(2/72) model but that the AWC/75 and IGS/75 are better for predicting vector fields.

N80-25968/2 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
On the Efficiency of Meridional Eddy Transport Processes During the Major Stratospheric Warming of January 1977.
V. B. Rao, and J. P. Bonatti. Mar 80, 21p INPE-1687-RPE/118
Revised. Submitted for Publication.

Correlation coefficients between the meridional wind and zonal wind and meridional wind and temperature measure the efficiencies of eddy transports of momentum and heat respectively. Efficiencies are calculated in terms of these correlation coefficients for the major warming event of January 1977. It is found that the eddies are more efficient in transporting heat than in transporting momentum. Further, the efficiency of heat transport increased substantially before the meridional temperature gradient reversed. Increase of efficiency in heat transport is found to be related to the increased westward tilt of a wave in the height field. Since this tilt is known to be associated with vertical, propagation of wave energy, interesting connections are inferred between the efficiencies of eddy transports, wave structure, and energetics during a stratospheric warming.

N80-25969/0 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Longitudinal and Latitudinal Abnormalities in the Daily Variation of F0F2 in the South American Region.
R. P. Kane. Apr 80, 30p INPE-1722-RPE/127
Revised. Submitted for Publication.

The daily variation characteristics of f0F2 at locations in the South American region were studied for the IGY period. For pairs of stations at roughly similar dip latitudes, but either in different hemispheres or at different longitudes in the same hemisphere (particularly southern), considerable differences, qualitative as well as quantitative, were observed. Whereas the possibility that these are due to differences in electrodynamic effects, cannot be ruled out, it is suggested that irregular precipitation of low energy electrons from the magnetosphere could also be a possible cause.

N80-25970/8 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Comparison of F0F2 Characteristics at Nearby Equatorial Locations in the South American Region.
R. P. Kane. May 80, 16p INPE-1737-RPE/136
Revised. Submitted for Publication.

The daily variation characteristics of ionospheric f0F2 at two locations on the magnetic equator in the American region viz. Huancayo (12 deg S, 75 deg W, Dip angle 2 deg N) and Natal (5 deg S, 35 deg W, dip angle 1 deg - 2 deg S in 1958 - 62) show considerable differences. Possible causes could be differences in electrodynamic effects and/or particle precipitation from magnetospheric regions at Natal, which is near the South Atlantic Geomagnetic Anomaly.

N80-25971/6 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Examination of the Empirical Flux-Profile Models in the Atmospheric Surface Boundary Layer.
Y. Viswanadham. May 80, 28p INPE-1747-RPE/140
Revised. Submitted for Publication.

Values of Richardson number (Ri) and the wind profile Deacon number (beta) in the atmospheric surface layer are evaluated from the different experimental data sources. The relationship between Ri and beta shows some scatter, but gives agreement with the theoretical relations derived by empirical models for unstable conditions and for inversion conditions.

N80-25972/4 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Association Between Plasma Bubble Irregularities and Airglow Disturbances over Brazilian Low Latitudes.
J. H. A. Sobral, M. A. Abdu, C. J. Zamlutti, and I. S. Batista. May 80, 9p INPE-1748-RPE/141
Revised.

Meridional profiles of OI 6300 A nightglow emission measured using a scanning photometer over Cachoeira Paulista, a low latitude station, show propagating patches of airglow disturbances with north to south and west to east velocity components, occuring mostly in the premidnight period. Measurements carried out during a period of 26 months since January 1978, show significant seasonal dependence in the occurance of these disturbances, with most of the event occuring in the spring to summmer months and with very rare occurance during the winter solstice. The north to south propagation velocities lie in the range of 150 to 350 m/s. A case by case comparison of the occurrences of these airglow disturbances with simultaneous ionograms over Cachoeira Paulista show that almost the totality of these disturbances are accompanied by strong range type echoes in the ionograms and vice versa. These results therefore support the earlier contention that these types of airglow disturbances might be manifestations of the equatorial ionospheric plasma bubbles.

N80-25973/2 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Magnetopause Reconnection.
W. D. Gonzales. Jan 80, 42p INPE-1667-RPE/106
Revised. Submitted for Publication.

A revised model is presented to compute the electric potential of reconnection at the magnetopause for nonpolar geomagnetic field lines as a function of solar wind parameters. The model incorporates the recently claimed role that the Bx component of the interplanetary magnetic field seems to play in magnetopause reconnection, introducing a north-south asymmetry to the geometry of reconnection and consequent convection. This model is also extended to the cases when magnetopause reconnection on polar field lines becomes important. The Bx effect seems to be of the same nature, both, for magnetopause reconnection on nonpolar as well as on polar geomagnetic field lines, large (small) values of Bx result in a smaller (larger) reconnection potential.

N80-25974/0 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Spaced Lidar and Nightglow Observations of an Atmospheric Sodium Enhancement.
B. R. Clemesha, V. W. J. H. Kirchhoff, D. M. Simonich, H. Takahashi, and P. P. Batista. Jan 80, 21p INPE-1675-RPE/110
Submitted for Publication.

On the night of August 25 and 26, 1979, a large enhancement was observed in the density of atmospheric sodium at a height of 95 km. The enhancement, lasting about 15 minutes and extending over a height range of about 2 km, was observed at three positions about 50 km apart. Increases in sodium airglow occurring almost simultaneously were observed at two points separated by 107 km. From the time lags between the occurrence of the enhancement at the various measuring points, it is concluded that it was caused by the horizontal motion of a cloud of sodium with a density about 10 times the normal density at the peak of the sodium layer. The cloud appears to have been moving in an approximately SW direction with a velocity of the order of 200 m/s. On the assumption that the sodium was of meteoric origin, it is concluded that a minimum of 10 kg of meteoric material was necessary for its formation. From the magnitude of the observed increases in sodium abundance and sodium airglow, a value of 3 x 10 to the 13th power/cu m is derived for the ozone density at 95 km.

N80-25975/7 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Equatorial Counterelectrojet: Two Distinct Categories.
R. P. Kane. Feb 80, 8p INPE-1683-RPE/114
Revised.

It is shown that among the equatorial counterelectrojets, there are two distinct categories, the fast one and the slow one, having different characteristics.

N80-25976/5 PC **A07**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Some Observed and Theoretical Aspects of the Sudden Stratospheric Heating in the Northern and Southern Hemispheres Alguns Aspectos Observados E Teoricos Do Aquecimento Estratoferico Brusco Nos Hemisferios Sul E Norte.
M.S. Thesis.
J. P. Bonatti. Jan 80, 144p INPE-1671-TDL/016
Text in Portugese; English Summary.

Synoptic and dynamic characteristics of the stratospheric warming of January 1977 in the Northern Hemisphere and the final warming of 1969 in the Southern Hemisphere are discussed. In the Northern Hemisphere case many of the features of the warming event are similar to those of a major warming while in the Southern Hemisphere the warming is shown to be minor. Synoptic charts, calculations of the scale and kinetic energy distribution as a function of wavelength, show that planetary scale waves dominated before the warming and shorter waves became important after the warming. The generation of short waves might be due to barotropic instability or nonlinear interaction. Calculation of the efficiency of eddy transports of momentum and heat shows some interesting results. Eddies seem to be more efficient in transporting heat than momentum. Further, efficiency of heat transport increases substantially before the warming. Energetics of the 1977 warming event show many similarities to the previous calculations, although the (K sub E, K sub Z) conversion was different.

N80-26125/8 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

Review of Spectroscopic Data for Measurements of Stratospheric Species.
A. Goldman, and J. Hoell. Jun 80, 34p NASA-CP-2136, L-13768
Workshop Held at Hampton, VA., 29-30 Oct. 1979.

Results and recommendations from a two day workshop are discussed. A review of the current status of experimental and theoretical spectroscopic data on molecules of stratospheric interest is given along with recommendations for additional research. Methods for disseminating new and existing data are also discussed.

N80-26253/8 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Maximum Entropy Spectral Analysis of Geomagnetic Disturbing Indices.
R. P. Kane. Mar 80, 21p INPE-1693-RPE/120-REV
Revised.

Burg spectra of geomagnetic disturbance indices Ap, AN, AS, AE, AU, AL, Dst and Cosmic ray neutron intensity at Deep River were obtained for 1965 and 1969 from daily means and for longer periods from monthly means also. A large number of peaks of periodicities from 2 days to several years is obtained, many of which are shown by all the indices and are likely to be genuine. Some of these are harmonics of the 27 days solar rotation period and the 10.2 years sunspot cycle period but may others do not find ready explanation. Results are compared with those of earlier workers who reported fewer peaks.

PB80-193907 PC **A05**/MF **A01**
Asian Inst. of Tech., Bangkok (Thailand).
The Availability of Solar Energy in Thailand,
R. H. B. Exell, and Kaya Saricali. Feb 76, 93p AIT/RR-63
Sponsored in part by Agency for International Development, Washington, DC., and John F. Kennedy Foundation of Thailand, Bangkok.

Meteorological data have been used to produce a comprehensive survey of the solar energy available in Thailand. The results have been presented in a form suitable for use in designing and predicting the performance of solar energy equipment. Geographical, seasonal, and diurnal variations of global solar radiation in Thailand are surveyed. Detailed maps are given of the geographical distribution of solar radiation prepared from data on cloudiness at 44 stations, duration of sunshine at 18 stations, and linear regressions relating radiation to sunshine at Chiang Mai and Bangkok. Rough estimates of diffuse solar radiation and atmospheric turbidity are made from the radiation–sunshine regression parameters. Fluctuations in the daily solar radiation are examined in an unbroken five-year sequence of measurements at Bangkok, and are also estimated from daily sunshine measurements at Bangkok and three other stations in Thailand. The time series of daily totals of global solar radiation at Bangkok is analyzed as a second order random process. The observed annual frequencies of runs of consecutive days with low radiation at Bangkok are given. The diurnal variation of global solar radiation determined from hourly measurements at Chiang Mai and Bangkok is analyzed.

PB80-193923 PC **A03**/MF **A01**
Asian Inst. of Tech., Bangkok (Thailand).
Atmospheric Radiation in a Tropical Climate,
R. H. B. Exell. Jun 78, 40p AIT/RR-71
Sponsored in part by Agency for International Development, Washington, DC., and John F. Kennedy Foundation of Thailand, Bangkok.

A method is described for estimating the downward atmospheric radiation flux from the surface air temperature with corrections for the radiation from cloud layers and for the effects of diurnal variations in the air temperature lapse rate near the earth's surface. Details are also given of a method of calculating this radiation using upper air data; and new atmospheric flux emissivities that include the effects of water vapor, carbon dioxide, ozone, and aerosols are tabulated versus water vapor optical depth. The data presented are suitable for use in Thailand and other similar tropical climates.

PB80-198799 PC **A05**/MF **A01**
National Bureau of Standards, Washington, DC. National Measurement Lab.
Kinetic and Photochemical Data for Atmospheric Chemistry Reactions of the Nitrogen Oxides.
Final rept. Jan-Dec 79,
R. F. Hampson, Jr. May 80, 95p NBSIR-80-2032
Contract DOT-FA79WAI-005
Sponsored in part by National Aeronautics and Space Administration, Washington, DC.

This report contains 24 individual data sheets for thermal and photochemical reactions of importance in the atmospheric chemistry of the nitrogen oxides. For each reaction the available experimental data are summarized and critically evaluated, and a preferred value of the rate coefficient is given. The selection of the preferred value is discussed and an estimate of its accuracy is given. For the photochemical process the data are summarized, and preferred values for the photoabsorption cross section and primary quantum yields are given. These data sheets were prepared by the author for the evaluation by the CODATA Task Group on Chemical Kinetics to be published in the Journal of Physical and Chemical Reference Data.

PB80-200025 PC **A99**/MF **A01**
National Oceanic and Atmospheric Administration, Boulder, CO. Space Environment Lab.
Solar-Terrestrial Predictions Proceedings. Volume IV. Prediction of Terrestrial Effects of Solar Activity,
Richard F. Donnelly. Mar 80, 660p NOAA-80060202
See also Volume 2, PB80-183361. Workshop held April 23-27, 1979 at Boulder, CO.

Volume IV includes many papers about predicting ionospheric and radio propagation conditions, which reflects the continued importance of this traditional applications area of solar-terrestrial predictions. Many of these papers for radio propagation predictions are based primarily on empirical or statistical relations. Predictions of sporadic E, spread F, and scintillations generally involve statistical or empirical predictions and still seem quite far removed from the physical-prediction approach. The last chapter includes some controversial topics, namely the correlation between solar-activity and terrestrial seismic activity and the possible relation between solar activity and biological effects. Controversial papers have been included to point out these topics of research within the broad field of solar-terrestrial predictions and to encourage further research and constructive scientific criticism of these topics.

4B. Meteorology

AD-A085 325/9 PC **A07**/MF **A01**
Naval Oceanography Command Detachment Asheville NC
Climatic Study of the Near Coastal Zone, Persian Gulf and Gulf of Oman.
Reference rept.
May 80, 134p
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

This climate study consists of monthly charts and tables of (1) visibility, (2) ceiling-visibility (low), (3) ceiling-visibility (mid-range), (4) scalar mean wind speed, (5) wind speed less than 11 and greater than or equal to 34 kts, (6) wind speed 11-21 and 22-33 kts, (7) surface wind roses, (8) air and sea temperature, (9) wave height isopleths, (10) wave height tables and (11) surface currents (seasonal). (Author)

AD-A085 330/9 PC **A02**/MF **A01**
Naval Oceanography Command Center/Joint Typhoon Warning Center FPO San Francisco 96630
Tropical Cyclone Minimum Sea Level Pressure - Maximum Sustained Wind Relationship.
Technical note,
Olaf M. Lubeck, and John D. Shewchuk. Apr 80, 16p Rept no. NAVOCEANCOMC/JTWG-TN-80-1

This paper investigates empirical relationships between maximum sustained surface winds and minimum sea-level pressure in western North Pacific tropical cyclones. The empirical equation developed by Atkinson and Holliday (1977) is reviewed and evaluated using 13 independent cases collected since the original study. New relationships were developed using the original dependent data set in Atkinson and Holliday and were tested also against the 13 independent cases. These new relationships were based on different assumptions for reducing observed peak wind gusts to one-minute sustained surface winds. There were no significant differences between the original Atkinson and Holliday relationship and the new relationships. Introducing environmental pressure and latitude as additional predictors did not improve the pressure-wind relationship. (Author)

AD-A085 525/4 PC **A02**/MF **A01**
Air Force Environmental Technical Applications Center Scott AFB IL
Cloud Cover and Visibility Climatology for the Philippines.
Final rept.,
Daniel E. Mitchell. May 80, 14p Rept no. USAFETAC/PR-80/001

This report provides cloud cover and visibility climatology for 19 locations in the Philippines. The mean number of days with total cloud amount less than or equal to one-tenth and visibility greater than or equal to 6 miles for each month and by hours of the day are provided for each location. (Author)

AD-A085 528/8 PC **A03**/MF **A01**
Army Electronics Research and Development Command Wsmr Nm Atmospheric Sciences Lab
12823A LANCE Missile Number 5093, Round Number 344 NCL, 16 April 1980.
Meteorological data rept.
Apr 80, 31p Rept no. ERADCOM/ASL-DR-1144

Meteorological data gathered for the launching of the 12823A LANCE, Missile Number 5093 and Round Number 344 NCL are presented in tabular form. (Author)

AD-A085 530/4 PC **A04**/MF **A01**
Geo-Atmospherics Corp Lincoln MA
Cloud/Icing/Visibility Analysis System (CIVAS) and Forecast Development Plan.
Technical rept.,
Wayne D. Mount, B. Richard Fow, and Bruce D. Mount. Apr 80, 71p ERADCOM/ASL-CR-80-0089-1
Contract DAAD07-79-C-0089

Geo-Atmospherics Corporation previously developed atmospheric models, meteorological data interpretation techniques, and computer software to provide a Cloud/Fog/Analysis System (CFAS) and Cloud/Fog Application Routines (CFAR). The CFAS assimilates the four-dimensional distribution of weather information by taking into account type, age, and location of meteorological observations to perform an objective analysis to specify each weather variable on a moveable three-dimensional array of grid points. This data base generated by CFAS can be used individually or its parts analyzed to tailor operational products to a given application. Our CFAR was developed to interrogate the CFAS data base, extract, analyze, and display a map of each chosen parameter, i.e., sky cover, ceiling, visibility, precipitation, severe weather, cloud base, cloud top, and cloud amounts within nine different layers extending from the surface to 3000 meter altitude, the highest level of interest to Army aviation. These techniques have been expanded to develop a Cloud/Icing/Visibility Analysis System (CIVAS) to deduce the three-dimensional distribution of clouds, aircraft icing threat, and visibility, on a horizontal grid scale of 5 km.

AD-A085 571/8 PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD Ship Performance Dept
Development of Consistent Natural Environment Parameter Sets for Combatant Capability Assessment (CCA).
Final rept.,
Wah T. Lee, and Susan L. Bales. Mar 80, 45p Rept no. DTNSRDC/SPD-0795-02

In order to design and model some combat systems, it may be necessary to consider joint distri-

butions of two or more natural environment parameters. This can be accomplished by simultaneous sampling of various natural environment parameters. A major part of the investigation reported herein is the development of wind generated significant wave height as a function of latitude for the Northern Hemisphere, however, a joint sampling of other surface and atmospheric parameters is also included. (Author)

AD-A085 645/0 PC **A03**/MF **A01**
Naval Air Systems Command Washington DC
Operational Uses of Micrometeorology for Ships at Sea,
J. W. Ownbey. Jun 72, 38p Rept no. NAVAIR-50-1P-9

The movement (speed and direction) and diffusion of small particles or droplets depends on the atmospheric environment in various ways and to varying degrees. The knowledge of these environmental factors and the ability to forecast the effects of these factors provides a military commander a means to use the environment of his advantage. Persistence studies of wind, direction and speed, stability, and relative humidity permit probability forecasts for the movement and diffusion of particles in the atmosphere. These forecasts can be used in defensive or offensive operations. (Author)

AD-A085 653/4 PC **A03**/MF **A01**
Science Applications Inc Monterey CA
Tropical Cyclone Wind Threat for the Bay of Bengal.
Final rept.,
Jerry D. Jarrell. Oct 79, 46p
Contract AID-SOD-PDC-C-0110

The problem in the Bay of Bengal is partly attributable to the distribution of population in low lying and unprotected areas along the bay, but more important is the configuration of the bay which results in large cyclone induced storm surges (often incorrectly referred to as tidal waves). These surges are an elevation of the sea surface because of the 'barometer effect' (pushing up the water into the cyclones central low pressure) combined with the buildup of wind driven water along the coast. These are superimposed on the astronomical tides which have a 12-hourly period (two highs and two lows per day) and a large tidal range at least with some combinations of the solar-lunar cycles. An unfortunate coincidence of a large storm surge and high tide can increase the mean water level by several meters, thus inundating large coastal areas with devastating effects. Forecast errors have gradually been reduced over the past few decades, but still they persist and their reduction seems to have leveled off in the decade of the seventies (Jarrell et al 1978, Neumann 1978). The improvement was most pronounced in the regions of the world where observation improved. This was mostly post WWII aircraft reconnaissance supplemented increasingly after 1964 by meteorological satellites. In the Bay of Bengal the satellite era is just emerging, thus we may expect to see improvement in forecasting capability there. The aim of this research was to develop a reliable estimate of the probability of 40, 65 and 100 kt winds for points under threat of a tropical cyclone.

AD-A085 662/5 MF **A01**
Science Applications Inc Monterey CA
Tropical Cyclone Wind Threat for the Bay of Bengal.
Progress rept.,
Jerry D. Jarrell. Jun 79, 41p Rept no. SAI-1-042-02-219-00
Contract AID-SOD-PDC-C-0110
Availability: Microfiche copies only.

The ultimate objective of this effort is to provide the OFDA with reliable estimates of damage and casualties that will result from a particular tropical cyclone in the Bay of Bengal. The contract objective is to design, develop, program and test a system suitable for automation to provide wind threat information from tropical cyclones in the Bay of Bengal.

AD-A085 810/0 PC **A02**/MF **A01**
Colorado State Univ Fort Collins Dept of Electrical Engineering
Estimation of Lateral and Rotational Cloud Displacement from Satellite Pictures,
Uwe L. Haass, and Thomas A. Brubaker. Oct 79, 17p Scientific-1, AFGL-TR-79-0287
Contract F19628-78-C-0207, Grant DAAG29-76-G-0324
Presented at the Workshop on Computer-Analysis of Time-Varying Imagery, held in Philadelphia, PA 5-6 April 1979.

Weather forecasting in the mesoscale range often remains problematic due to the rapid changes. With the advance of high-resolution imaging techniques, satellite pictures taken in short time intervals can be employed to improve interpretation and prediction of atmospheric situations by analyzing cloud motion and size parameters. Knowledge of these parameters allows estimation of wind fields as well as the establishment of time series in order to model the cloud development and extrapolate from past observations. Our objective is to find estimators that reveal not only information on lateral (x-y) displacement, but also on rotation of clouds. These estimators should perform well for a variety of meteorological conditions. Currently, a variety of cloud displacement estimators are competing for computational convenience and versatility in application (1-6). Our work concentrates on methods applying the Inner Product (popularly called cross-correlation) since we hope to combine a mathematically elegant theory with efficient strategies for application.

N80-25989/8 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
Rain Rate Range Profiling from a Spaceborne Radar.
R. Meneghini. Mar 80, 28p NASA-TM-80656

At certain frequencies and incidence angles the relative invariance of the surface scattering properites over land can be used to estimate the total attenuation and the integrated rain from a spaceborne attenuation-wavelength radar. The technique is generalized so that rain rate profiles along the radar beam can be estimated, i.e., rain rate determination at each range bin. This is done by modifying the standard algorithm for an attenuating-wavelength radar to include in it the measurement of the total attenuation. Simple error analyses of the estimates show that this type of profiling is possible if the total attenuation can be measured with a modest degree of accuracy.

N80-25990/6 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
On the Momentum Transport by the Stationary Waves Forced by the Topography.
P. Satyamurty, and V. B. Rao. Apr 80, 24p INPE-1720-RPE/125
Revised.

A steady barotropic primitive equation model is solved by spectral methods for the stationary waves forced by topography between 60 N and 60 S. The meridional transports of momentum by these waves are compared with those calculated earlier from observations. The cross equatorial exchange of momentum by these waves is negligible compared to that by observed standing waves and thus the present study suggests the importance of the thermally forced stationary waves. The role of friction in determining the tilt, amplitude and the momentum transport is very crucial.

N80-25991/4 PC **A08**/MF **A01**
Arkansas Univ., Fayetteville. Dept. of Mathematics.
Statistical Analysis of Multivariate Atmospheric Variables.
Final Report.
J. D. Tubbs. 31 Mar 79, 158p NASA-CR-161472
Contract NAS8-31550

Topics covered include: (1) estimation in discrete multivariate distributions; (2) a procedure to predict cloud cover frequencies in the bivariate case; (3) a program to compute conditional bivariate normal parameters; (4) the transformation of nonnormal multivariate to near-normal; (5) test of fit for the extreme value distribution based upon the generalized minimum chi-square; (6) test of fit for continuous distributions based upon the generalized minimum chi-square; (7) effect of correlated observations on confidence sets based upon chi-square statistics; and (8) generation of random variates from specified distributions.

N80-25992/2 PC **A07**/MF **A01**
Computer Sciences Corp., Huntsville, AL.
Vector Wind Profile Gust Model.
Midterm Report, 10 Apr. - 10 Oct. 1979.
S. I. Adelfang. 20 Oct 79, 145p NASA-CR-161474
Contract NAS8-33433

Work towards establishing a vector wind profile gust model for the Space Transportation System flight operations and trade studies is reported. To date, all the statistical and computational techniques required were established and partially implemented. An analysis of wind profile gust at Cape Kennedy within the theoretical framework is presented. The variability of theoretical and observed gust magnitude with filter type, altitude, and season is described. Various examples are presented which illustrate agreement between theoretical and observed gust percentiles. The preliminary analysis of the gust data indicates a strong variability with altitude, season, and wavelength regime. An extension of the analyses to include conditional distributions of gust magnitude given gust length, distributions of gust modulus, and phase differences between gust components has begun.

N80-25993/0 PC **A04**/MF **A01**
Computer Sciences Corp., Huntsville, AL.
Vector Wind Profile Gust Model.
Final Report, 10 Apr. 1979 - 9 Apr. 1980.
S. I. Adelfang, and B. A. Evans. 9 Apr 80, 65p NASA-CR-161475
Contract NAS8-33433

A methodology was developed for the derivation and analysis of small scale perturbations in Jimsphere wind profiles. Gusts in various wavelength bands have been derived from these perturbations; the probability distribution of gust components and associated gust length has been shown to be accurately represented by a gamma distribution. Theoretical and observed distributions of component gust vary significantly with season, altitude, and wavelength range. The results of this study provide the basis for a vector wind model for Cape Kennedy, Florida.

N80-25994/8 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
A Diffusion Climatology for Cape Canaveral, Florida.
R. K. Siler. Apr 80, 50p NASA-TM-58224

The problem of toxic effluent released by a space shuttle launch on local plant and animal life is discussed. Based on several successive years of data, nine basic weather patterns were identified, and the probabilities of pattern occurrence, of onshore/alongshore cloud transport, of precipitation accompanying the latter, and of ground-level concentrations of hydrogen chloride were determined. Diurnal variations for the patterns were also investigated. Sketches showing probable movement of launch cloud exhaust and isobaric maps are presented.

N80-25996/3 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Numerical Weather Prediction and Its Outlook in Brazil Previsao Numerica de Tempo E Sua Perspectiva No Brasil.
M. A. M. Lemes, and A. D. Moura. Jan 80, 40p INPE-1670-RPE/108
Text in Portuguese; English Summary. Presented at the 37ST Reuniao DA Sbpc, Fortaleza, Brazil, Jul. 1979.

A chronological description of the major events, considered milestones in the evolution of Numerical Weather Prediction (NWP) is presented. The scientific problem of NWP is briefly discussed and the basic requirements that must be fulfilled in the implantation of NWP, on an operational basis, are pointed out. Finally, a survey of the state-of-the-art of NWP in Brazil is included, together with an ex-

ample of a numerical forecast obtained with a primitive equation barotropic model.

N80-25997/1 PC **A07**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
A Hydrometeorological Model for Medium Sized Hydrographic Basins Um Modelo Hidrometeorologico Para Bacias Hidrograficas de Medio Porte.
M.S. Thesis.
J. C. Demoraes. Apr 80, 145p INPE-1729-TDL/025
Text in Portuguese; English Summary. Revised.

The model proposed is a technique of hydrometeorological simulation, which consists of assigning mathematical functions for phenomena in hydrological cycle and simulating their interactions. The area under study is divided into finite elements called 'cells'. The water balance is included in every individual cell throughout the simulation. The superficial and channel processes are followed at any point in the basin in such a way that at any time of the simulation an instantaneous microscale picture (view) of the behavior of the basin is obtained. The hydrogram of the cell at the mouth of the river gives the overall behavior. The results obtained with a few hypothetical simulations are compatible with those expected. The tests demonstrate the possibility of simulation of diverse types of precipitation because the input is quite flexible. However, only an application to a true (real) basin could validate the model proposed. The algorithm is implemented in Algol on the B-6700 machine in a very general program which permits modification of the functions used.

N80-25998/9 PC **A07**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
A Climatological Study of the Wind and Temperature Fields for the Upper Levels over South America Um Estudo Climatologico DOS Campos de Vento E de Temperatura Nos Niveis Superiores Sobre a America Do Sul.
M.S. Thesis - 1979.
Z. R. Sobral. Jan 80, 149p INPE-1672-TDL/017
Text in Portuguese; English Summary.

The monthly mean resultant winds and mean temperature maps for South America, for four months of the year, representing the four seasons, (January, April, July and October) were analyzed for the levels 850 mb up to 200 mb - period 1969-1973. Analyses of the wind fields emphasized the positions of the subtropical ridges. The movements of the ridge lines between one year and another are discussed. Apart from these, the annual march of temperatures at various latitudes and the profile of temperatures along meridian 60 deg W are discussed.

N80-25999/7 PC **A04**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Introduction to Interpreting Satellite Imagery Introducao a Interpretagao de Imagens de Satelites.
M. A. Fortune, and N. J. Ferreira. Feb 80, 75p INPE-1681-RPE/113
Text in Portugese; English Summary.

The basic meteorological concepts necessary for understanding the techniques of cloud system analysis using satellite imagery are outlined. The various types of satellite data and imagery and their diverse applications are included. Atmospheric radiation pertinent to satellite observations, systems of cloud analysis based on cloud appearances and patterns, and the major components of atmospheric circulation are among the topics considered. Photointerpretation of various weather systems, mesoscale and synoptic scale, in both the tropics and the midlatitude is discussed.

N80-26006/0 PC **A05**/MF **A01**
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (Germany, F.R.). Inst. fuer Physik der Atmosphaere.
The Precipitation Enhancement Project (PEP).
D. Paffrath. Sep 79, 88p DFVLR-MITT-79-12, ESA-TT-642
Text in German; English Summary. Report Will Also Be Announced as Translation (Esa-TT-642).

The following workshop discussion topics are described: physics of clouds and precipitation, theories of weather modification, aircraft measuring systems, application of weather radar, microphysical measurements, condensation and ice nuclei, cloud seeding technology, hail suppression, and fog dispersal.

PB80-195977 PC **A06**/MF **A01**
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
Great Lakes Degree-Day and Temperature Summaries and Norms, 1897-1977.
Data rept.,
R. A. Assel. Jan 80, 120p GLERL-15, GLERL-CONTRIB-202, NOAA-80051201

Daily maximum and minimum air temperatures at 25 locations on the perimeter of the Great Lakes for the period 1897 to 1977 were used to generate long terms means of daily air temperatures and freezing and thawing degree-days (FDD's and TDD's). In addition daily, weekly, and monthly FDD's and daily TDD's were calculated for the 81 summer and 80 winter seasons between 1897 and 1977. This report describes the computational procedure and presents graphs and tables resulting from this analysis. The complete analysis is too voluminous to present in hard copy, but is available on microfilm.

PB80-196033 PC **A03**/MF **A01**
National Weather Service, Salt Lake City, UT. Western Region.
NMC Model Performance in the Northeast Pacific,
James E. Overland. Apr 80, 27p NOAA-TM-NWS-WR-151, NOAA-80051301
Also pub. as National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab. Contrib. No. 388.

Central pressure and position errors of low centers for 36-hr sea-level pressure forecasts were compared between the LFM-II and 6LPE models for December 1977 and the LFM-II and 7LPE models for 19 January through 28 February 1978. Nine storms provided 41 cases in December and 20 storms provided 66 cases in January through February. During December the LFM-II was superior to the 6LPE in locating rapidly moving storms. The position errors for the LFM-II in December were on the order of 250 km. During February both the LFM-II and the 7LPE had median position errors on the order of 450 km; also, both had a high percentage (25%) of observed-but-not-forecast low centers. The larger errors in February were related to resolution of initial cyclogenesis.

PB80-196959 PC **A02**
National Meteorological Center, Washington, DC.
An Evaluation of Early Operational Temperature Soundings from TIROS-N,
N. Phillips, L. McMillin, A. Gruber, and D. Wark. Oct 79, 12p NOAA-80051902
Pub. in Bulletin of the American Meteorological Society, v60 n10 p1188-1197 Oct 79.

Properties of atmospheric temperatures obtained from the first four months of TIROS-N observations are described, together with a short summary of the relevant processing techniques for obtaining temperatures from measured radiances.

PB80-197189 PC **A05**/MF **A01**
National Oceanic and Atmospheric Administration, Miami, FL. Research Facilities Center.
Determination of Atmospheric Water Vapor from Dewpoint Measurement.
Technical memo.,
H. H. Grote. Apr 80, 85p NOAA-TM-ERL-RFC-5, NOAA-80050901

In Atmospheric Physics water vapor is one of the most important parameters besides temperature and pressure. There is, however, no method to measure the water vapor content of the atmosphere directly with the accuracy required. Thus atmospheric water vapor is frequently determined by the measurement of the dewpoint. The formation of dew on a mirror surface can be controlled automatically by electro-optical means and provides a very precise measurement of the dewpoint. This report compiled frequently used information on parameters related to water vapor and dewpoint. First the saturation vapor pressure over water is expressed by an equation that has the dewpoint as input and approximates the values given in the Smithsonian Tables. This equation forms the basis for all further discussions. An equation is given for the conversion of a measured dewpoint to equivalent dewpoint at sea level. For aircraft measurements the error in dewpoint is tabulated for differences between the actual static pressure and the measured value. Then equations for absolute and relative humidity and virtual temperature are derived. Finally curves for the Poisson constant are given.

PB80-199482 PC **A06**/MF **A01**
National Oceanic and Atmospheric Administration, Washington, DC. Federal Coordinator for Meteorological Services and Supporting Research.
The Federal Plan for Meteorological Services and Supporting Research, Fiscal Year 1981,
T. B. Owen. Mar 80, 120p FCM-80-3, NOAA-80051901
See also report dated Mar 79, PB-296 519.

This Federal Plan is the sixteenth in an annual series, produced in compliance with Section 304 of Public Law 87-843, to provide the Congress with a description of governmental programs in meteorology, and to outline the specific functions and funding requested by each Agency involved.

5. BEHAVIORAL AND SOCIAL SCIENCES

5A. Administration and Management

AD-A085 385/3 PC **A02**/MF **A01**
Georgia Inst of Tech Atlanta School of Industrial and Systems Engineering
The Economic Design of Control Charts: A Review and Literature Survey.
Technical rept. 1 Apr 79-31 Mar 80,
Douglas C. Montgomery. 1980, 14p
Contract N00014-78-C-0312
Pub. in Jnl. of Quality Technology, v12 n2 p75-87 Apr 80.

No abstract available.

AD-A085 394/5 PC **A09**/MF **A01**
RAND Corp Santa Monica CA
Rule-Based Modeling as an Analysis Tool: Implications for Resource Allocation Within the Strategic Air Command,
Interim rept.,
Richard Fallon. Apr 80, 190p Rept no. RAND/N-1489-AF
Contract F49620-77-C-0023

Examines the potential of rule-based modeling as an analysis tool for investigating resource allocation policy issues. Focus is on resource allocation within B-52 flying organizations of the Strategic Air Command. A rule-based computer system, DOSS (Decision Oriented Scheduling System), is demonstrated to provide a valid model of many variables that affect resource allocation of aircrews and aircraft. DOSS is then used to analyze effects on wing performance of several alternative decision rules and policies. Analysis focuses on the capability of SAC bomb wings, given current resources, to increase the SAC alert force and to fly more training sorties. The analysis has implications for the particular policy issues examined, but its more general aim is to illustrate the potential of DOSS for examining a broad range of resource allocation policy issues within SAC. A number of implications are discussed regarding the potential of rule-based modeling for improving organizational decision making in general.

AD-A085 597/3 PC **A03**/MF **A01**
Navy Personnel Research and Development Center San Diego CA
A Study of Flexitime Effects in a Government Research Organization.
Preliminary rept. 1 Apr-30 Jun 79,
Kevin G. Smith. May 80, 33p Rept no. NPRDC-TR-80-27

This effort examined the effects of variable work hours upon employee attitudes and behavior in a large government research organization. Employees at experimental sites--where flexitime was implemented--were compared with those at matched (control) sites on attitudinal and behavioral measures taken before and after flexitime began. Results showed that flexitime is not related to improved employee attitudes and work behaviors, or to changes in perceptions of their work roles. Although subordinates were generally more favorable toward flexitime than supervisors, the views of both groups become more positive over time. Productivity did not change as a result of flexitime, but reduced use of sick leave resulted in a projected annual savings of nearly $400,000. (Author)

AD-A085 631/0 PC **A12**/MF **A01**
Army Missile Command Redstone Arsenal AL Technology Integration Office
Research and Development Project Prioritization - Computer Model.
Management rept.,
Edward B. Dobbins, Jr. Apr 80, 260p Rept no. DRSMI/RN-80-2
See also AD-A085 988.

This report is based upon research concerned with the aggregation of multiple lists of rank ordered research and development (R&D) projects or product requirements needing R&D. The resultant prioritized list serves as a basis for resource allocation to the R&D projects. The rank orders are ordinal and without feedback or strategy. The model and computer code use validated methods to compute the aggregation of up to 100 rank ordered lists of up to 100 alternatives. Final lists are computed by the Shannon Borda, and Fuzzy set rank order methods. This report contains a complete computer code listing and map, and five representative examples of the variety of problems that can be computed. (Author)

AD-A085 633/6 PC **A12**/MF **A01**
Army Mathematics Steering Committee
Proceedings of the Conference on the Design of Experiments in Army Research, Development, and Testing (25th) Held at Natick Massachusetts 17-19 October 1979.
Interim technical rept.
May 80, 271p ARO-80-2

Through these symposia the AMSC hopes to introduce and encourage the use of the latest statistical and design techniques into the research, development and testing conducted by the Army's scientific and engineering personnel. It is believed that this purpose can be best pursued by holding these meetings at various government installations throughout the country.

AD-A085 732/6 PC **A09**/MF **A01**
Boeing Aerospace Co Seattle WA
Prepare and Evaluate an Organizational Relocation Plan.
Final rept. Jan 79-Apr 80,
John M. Miller, I. James Carney, Paul J. Parham, and George R. Pedersen. Apr 80, 178p
Contract DCPA01-79-C-0218

Crisis relocation is a form of civil defense which involves evacuating major cities if war threatens. Organizational relocation (OR) could be an important part of crisis relocation. Many organizations, especially large firms, have the means to move employees and dependents. (Author)

DOE/S-0010(80) PC **A09**/MF **A01**
Department of Energy, Washington, DC.
Secretary's Annual Report to Congress.
Jan 80, 184p

This second annual report of the DOE covers activities of all elements of the department except the independent FERC, which issues its own annual report. Individual chapters concern a posture statement, conservation, solar and other renewable energy, fossil energy, electric energy, nuclear energy, the environment, defense programs, international programs, general science programs, energy information, economic regulation, energy production, and support operations. The following appendixes are also included: foreign direct investments in US energy sources and supplies, exports of energy resources by foreign companies, major recipients of DOE funding, actions taken regarding disclosure of energy assets by DOE employees, financial assistance programs for alternative fuel demonstration facilities, and 1978 budget summary. 16 figures, 56 tables. (ERA citation 05:019876)

N80-26197/7 PC **A06**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Analysis of the Uncertainties Associated with Cost Estimation Analise DA Incerteza Associada a Estimacao de Custos.
M.S. Thesis.
L. A. N. Lorena. Mar 80, 107p INPE-1692-TDL/022
Text in Portugese; English Summary.

Some cost analysis techniques are considered as an integral part of cost-effectiveness analysis. Particular emphasis is given to the application of the Delphi method and statistical methods to cost analysis. The main thrust however, is to quantify cost uncertainities, proposing its use as a decision tool.

PB80-188089 PC **A04**/MF **A01**
National Association of Counties Research, Inc., Washington, DC.
Bridging the Revenue Gap,
Shelley Kossak. 1980, 52p HUD-0001386
Contract HUD-H-5052

The resource packet offers elected officials some ideas for coping with the fiscal pressures on their governments. A series of questions helps assess the specific problems of their jurisdictions. A section on revenue management helps clarify the issues at stake in determining the revenue mix for the citizens in their jurisdictions. The latter covers those factors that affect a community's ability to raise revenue and offers suggestions for officials who are seeking new sources of financing and trying to use existing sources more productively. Another section focuses specifically on user fees as one revenue option which allows citizens to prescribe levels of service in the marketplace through their willingness to pay. It charts the positive and negative sides of the public price system and provides a brief discussion on the issues. A section on controlling expenditures points out the detrimental long-term effects of both across-the-board cuts and wholesale elimination of entire programs. To avoid these approaches, officials should use this packet guide to set priorities, examine options rationally, identify areas in which expenditures can be reduced or eliminated, and then approach the public in a positive way designed to encourage their understanding and support. The packet also includes examples of counties which have instituted successful productivity improvement programs and cost-cutting measures. A list of outside resources available to counties is provided. Footnotes, tabular data, photographs, glossary of financial terms, and a bibliography are included.

PB80-188147 PC **A14**/MF **A01**
United States Conference of Mayors, Washington, DC. Inst. for Urban and Regional Economic Analysis.
A Mayor's Financial Management Handbook.
Feb 80, 304p HUD-0001435
Grant HUD-H-5051G

The handbook is intended to be used both as a training document for seminars in financial management and as a desk reference for mayors and their staffs to use in improving financial management and projecting financial policy plans. A discussion deals with the mayoral role in a broad range of financial policy issues. Principles, uses, and analysis are provided of municipal accounting, debt management and policy, and municipal pension planning. Recommendations for external sources of help in dealing with more serious financial problems identify Federal assistance avenues and discuss public interest groups. Brief descriptions portray financial management systems that have been developed in cities of various sizes and locations. Finally, attention is focused on the interrelationship between financial policysetting and management, possibly the most critical problem area for mayors today. Tabular and illustrative material and references are included with individual chapters.

PB80-189210 PC **A02**/MF **A01**
Denver Urban Observatory, CO.
Public Administration Field Service Program for Energy-Impacted Communities-Colorado, Utah, Wyoming. Executive Summary.
Final rept.
Dec 79, 21p HUD-0001412
Contract HUD-H-2506
See also PB80-189228.

The pamphlet summarizes a comprehensive report published separately on 41 projects carried out by the Field Service Program in Colorado, Wyoming, and Utah, where small, energy-impacted communities were facing problems resulting from the pressures of intensive industrial development. Graduate students under faculty guidance from four universities were involved with problemsolving in the areas of local administrative and management capacity building. The program placed 52 students in small towns where they produced comprehensive personnel systems, town housing plans, criminal justice training plans, and other products. The projects fall into the following categories: general administration, personnel, criminal justice, water resource planning, financial planning, commercial development, housing, master plan development, environmental impact assessment, engineering, and miscellaneous. City administrators reported a high level of satisfaction with the students' performance and indicated readiness to participate in future programs. Program administration and monitoring structures are outlined and program phases listed. A program chronicle and tabular data are included.

PB80-189228 PC **A03**/MF **A01**
Denver Urban Observatory, CO.
Public Administration Field Service Program for Energy-Impacted Communities-Colorado, Utah, Wyoming.
Final rept.
Dec 79, 50p HUD-0001411
Contract HUD-H-2506
See also PB80-189210.

The volume is the comprehensive final report on 41 projects carried out by the Field Service Program in Colorado, Wyoming, and Utah, where small energy-impacted communities are facing problems resulting from the pressures of intensive industrial growth. Graduate students under faculty guidance from four universities were involved with problemsolving in the areas of local administrative and management capacity building. The program placed 52 students in small towns where they produced comprehensive personnel systems, town housing plans, and criminal justice training programs. The projects fall under the following categories: general administration, personnel, criminal justice, water resources planning, financial planning, commercial development, housing, master plan development, environmental impact assessment, engineering, and miscellaneous. City administrators reported a high level of satisfaction with the students' performance and indicated readiness to participate in future programs. Program administration and monitoring structures are outlined and program phases listed. Recommendations for future programs are made. Tabular data, a program chronicle, footnotes, and an executive summary are included.

PB80-191612 PC **A04**/MF **A01**
Urban Inst., Washington, DC.
Zero-Base '80, The Status of Zero-Base Budgeting in the United States,
Allen Schick. Dec 77, 57p NSF/RA-790410
Grant NSF-APR77-20767
Prepared in cooperation with National Association of State Budget Officers, Washington, DC.

Zero-Base Budgeting (ZBB), a budget innovation of the 1970's, is defined as a method which formally considers reduced levels of expenditure rather than proposed increases above current expenditure levels. The distinctive purpose of ZBB is to determine whether an activity warrants continuation at its current expenditure level or at a different level, or should be terminated. The ZBB format provides for the submission of budget requests at alternative funding levels, and for the priority ranking of activities in successively increasing levels of funding, starting from a level below the current level. The report presents the findings of the Na-

tional Association of State Budget Officers survey. The focus is on the formalities of budgeting, such as the requirements for filing budget requests and methods of review. The report tries to gauge the progresses of zero-base budgeting in the states, as perceived by state budget officers. The data are based on the perspectives of budget officers rather than on the views of the participants, program managers, or operating agency heads.

PB80-192628 PC **A05**/MF **A01**
Illinois Commission on State Mandated Programs, Springfield.
State of Illinois Commission on State Mandated Programs: Report and Recommendations to Governor James R. Thompson.
Oct 77, 98p

The report is the effort of the Commission to respond to the needs of local government for changes in state mandates and in the state lawmaking and administrative attitudes which often give rise to unrealistic or burdensome mandates.

PB80-193154 PC **A04**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. Economic Development Div.
An Overview of Federal Programs Supporting Multicounty Substate Regional Activities.
Staff rept.,
Jerome M. Stam, and J. Norman Reid. May 80, 56p

The report presents an overview of Federal programs supporting multicounty substate regional activities with particular reference to their impact in nonmetropolitan areas. Selected issues pertaining to substate regionalism are explored and its development is placed in historical perspective. Federal programs supporting multicounty substate regional activities during the 1977-79 period are identified. The Federal programs are identified based on five criteria: (1) Federal connection, (2) multicounty area focus, (3) planning and policy development focus, (4) local control, and (5) a continuing nature. Under these criteria a total of 39 Federal programs are identified as being relevant. These programs are analyzed in some detail.

PB80-197767 PC **A10**/MF **A01**
Kearney (A. T.), Inc., Chicago, IL.
Preventive Maintenance Management Manual for Fossil Fuel Steam Electric Generating Plants.
Final rept.
Feb 80, 210p REA-BULL-163-2

The manual contains all useful elements of a comprehensive preventive maintenance (PM) Program for Fossil Fuel Steam Electric Generating Plants. Instructions are provided to evaluate a specific plant's needs for a formal PM Program, to design a program and install it. A method of evaluating the effect of the PM Program and adjusting it for optimum cost-effectiveness is presented. This manual can be described as a How-To-Do-Yourself Manual in the area of preventive maintenance for Fossil Fuel steam electric generating plants and is unique in concept.

5B. Documentation and Information Technology

AD-A085 513/0 PC **A05**/MF **A01**
Computer Corp of America Cambridge MA
Datacomputer and SIP Operations.
Final technical rept. for 1979,
R. Mark Chilenskas, Matthew Maltzman, Anil K. Nori, Joanne Z. Sattley, and Nancy I. Wolfe. 20 Feb 80, 85p Rept no. CCA-80-01
Contract N00039-79-C-0203, ARPA Order-3540

Computer Corporation of America continued to provide Datacomputer and SIP service to the ARPAnet community throughout the final quarter of 1979. The Datacomputer is a network-oriented database management utility which is used in diverse general networking applications. The Datacomputer's software system is designed to allow convenient and timely access to large on-line databases and to promote data sharing by multiple remote users communicating over a network. The seismic application was heretofore the largest user of the Datacomputer. This was true not only in terms of the amount of data stored, but also in terms of its complexity and the required bandwidth of transfer. CCA developed and operated a dedicated Seismic Input Processor (SIP) to field the real-time input stream. Both the real-time data stream storage via the SIP and the SRO files storage from the Albuquerque Seismological Laboratory were shut down during this reporting period.

AD-A085 554/4 Not available NTIS
Lockheed Missiles and Space Co Inc Palo Alto CA Palo Alto Research Lab
Database Management in Scientific Computing. I. General Description,
Carlos A. Felippa. 1 Mar 78, 9p
Availability: Pub. in Computers and Structures, v10 p53-61 1979 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A085 632/8 PC **A06**/MF **A01**
Office of Naval Research Scientific Liaison Group APO San Francisco 96503
ONR Tokyo Scientific Bulletin. Volume 5, Number 1, January-March 1980,
Rudolph J. Marcus, and Eunice Mohri. Mar 80, 118p
See also Volume 4, Number 4, AD-A084 457.

This is a quarterly publication presenting articles covering recent developments in Far Eastern (particularly Japanese) scientific research. It is hoped that these reports (which do not constitute part of the scientific literature) will prove to be of value to scientists by providing items of interest well in advance of the usual scientific publications. The articles are written primarily by members of the staff of ONR Tokyo, with certain reports also being contributed by visiting stateside scientist. Occasionally a regional scientist will be invited to submit an article covering his own work, considered to be of special interest. (Author)

DOE/TIC-4602 PC **A11**/MF **A01**
Department of Energy, Oak Ridge, TN. Technical Information Center.
Energy Information Data Base: DECOL Manual (Descriptive Cataloging ON-Line).
Jan 80, 247p

The DOE Technical Information Center (TIC) is responsible for creating bibliographic data bases that are used in the announcement and retrieval of publications of all types dealing with all phases of energy. This manual tells how data are initially entered into the TIC interactive processing system, and describes in detail the data elements and types of items included in the data bases. 21 tables. (ERA citation 05:021558)

ED-176 714 Not available NTIS
Communication Analysis of Information Complexes.
M. F. Malik. 1977, 16p
For related documents, see IR 005 024 and IR 005 028.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

Communication analysis is a tool for perceptual assessment of existing or projected information complexes, i.e., an established reality perceived by one or many humans. An information complex could be of a physical nature, such as a building, landscape, city street; or of a pure information nature, such as a film, television program, photographic picture, painting, or sculpture. Analysis takes into account the physical, formal, and behavioral properties of the information complex, and searches for scientific data to determine its information impact. References are made to the exhibition and display design field, production of films and television programs, and urban planning with the use of the communication analysis method.

ED-176 715 Not available NTIS
Illinois Univ. at Urbana-Champaign.
Bibliographic Instruction Objectives,
Mary M. Huston. Nov 78, 15p
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

The objectives presented define the basic information required of a student operating in the Library System of the University of Illinois at Urbana-Champaign. These statements of objectives are intended to provide a tangible framework for all public service personnel in the Undergraduate Library, and their various components can be coordinated to achieve three designated goals based on the premises that the average college student is unaware of most available bibliographic sources, that the library is a highly complex information system, and that the library staff should address itself to the coordination of library and classroom instruction. The first goal is to foster the student's comprehension of the total library system, and it involves instruction in library organization, the card catalog, the shelf list, the serial record, and the Library Control System. The second goal entrails making the student aware of services offered by the Undergraduate Library, such as reserves, media centers, reference, bibliographic instruction, and circulation. The third goal, that of alerting the student to the wide variety of available informational resources, is concerned with his or her exposure to reference books, monographic literature, periodical literature, government publications, newspapers, reference services, and referrals.

ED-176 716 Not available NTIS
Coopers and Lybrand, New York.
Review, Analysis and Evaluation of Certain Areas and Facets of Policies, Systems, Processes and Management of the U.S. Government Printing Office.
Oct 78, 383p
Prepared in cooperation with Joint Committee on Printing, Washington, DC.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

Covered in this report of the 1978 project of the Joint Committee on Printing are aspects of three selected areas. Part one, Management Review and Assessment, contains a summary of management and user interviews, a review of GPO's goals and organizational structure, and an assessment of management systems and procedures. The accounting system is analyzed in the second part, Accounting and Financial Management Assessment. Included are discussions of cost accounting, pricing, billing, and overall accounting procedures, as well as a comparison with industry practices. Technology Use Assessment (part three) evaluates the use of data processing technology, production technology, and micrographic technology. Each of these parts is concluded by recommendations and a summary of observations. The appendix discusses identification and listing of publications produced, stored, and/or distrubuted by GPO on a free or subsidized basis.

ED-176 717 Not available NTIS
The First Soviet-American Library Seminar: A Summary,
Murray L. Howder. May 79, 7p
For related documents, see IR 007 541-547.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

The first Soviet-American Library Seminar provided general comparisons and contrasts, similarities and dissimilarities, between Soviet and American libraries, and stressed the differences in understanding library terms, the need for long-range planning, demographic changes and their effect on library services, and library automation. An introductory session outlined procedures to be observed and presented representatives of the host organizations. Opening presentations described the library as a 'multimedia catalog of many civilizations' and praised the collaboration between the USSR and the United States in the library field, observing that such cooperation is within the terms of the Helsinki accord. During the formal afternoon sessions, Soviet delegates presented condensed versions of prepared papers and American reactors commented on each paper and asked questions drawn from prepared reactions. Afternoon presentations from the Soviet representatives discussed development and planning in Soviet library systems, library statistics, the role of the national library, the role of libraries in the satisfaction of the information needs of specialists, the network of children's libraries, and training of librarians.

ED-176 718 Not available NTIS
Library Service for Children in the USSR. Reaction paper by Marilyn Miller,
N. S. Kobzarenko. May 79, 55p
Papers presented at the Soviet-American Library Seminar (1st), Washington, DC., May 4-6, 1979. For related documents, see IR 007 541-547. Text in Russian and English.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

The development and management of children's libraries and library services in the USSR are discussed by N.S. Kobzarenko, State Republican Library for Children of the Ukraine, and comparisons and contrasts between that system and the U.S. system are outlined. Kobzarenko notes that library services for children, established along directives from V.I. Lenin, exist to help schools ensure educational process, to aid in the development of a child's personality and morals, and to assist parents, techers, and educators with questions regarding children's reading. Materials are regulated through a centralized State library system which publishes books through its own publishing houses. Librarians are trained in the guidance of reading using various detailed methods and programs. The improvement of professional skills of the staff is recognized through methodical centers for research and through government standards. Marilyn Miller, from the University of North Carolina School of Library Science, points out that library services in the United States and the USSR reflect each nation's ideological, social, and economic philosophies while both are dedicated to the welfare of the children served. Objectives for public library service, programming, and collections are compared.

ED-176 719 Not available NTIS
Library Statistics in Management System of Library Construction in the USSR. Reaction paper by Vernon E. Palmour,
E. A. Fenelonov. May 79, 49p
Papers presented at the Soviet-American Library Seminar (1st) Washington, DC., May 4-6, 1979. For related documents, see IR 007 541-547. Text in Russian and English.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

The development and use of library statistics in the Soviet Union and systems of reporting are discussed in this speech by E.A. Fenelonov, Ministry of Culture of the Russian Soviet Federal Socialist Republic, and are compared with statistical development in the United States by Vernon E. Palmour of King Research, Inc. Fenelonov emphasizes the use of library statistics in evaluation, planning and forecasting of future activities. A history of statistical development begins with major attention toward measurement and evaluation of external manifestations of library development and moves toward the forecasting approach to the problems of library business. Fenelonov stresses the centralization of library reporting and details the procedures used in the collection and processing of statistical data. The use of library statistics in management and coordination are described, and future collection and utilization methods are mentioned. An appendix lists the exponents of library statistics in different forms of library reports. Palmour briefly discusses similarities and differences in the use of library statistics in the United States and the USSR, and poses questions regarding national standards and reporting systems.

ED-176 720 Not available NTIS
The National Library of the USSR, Its Role in the Country's Library System. Reaction paper by Frank M. McGowan,
I. P. Osipova. May 79, 67p
Papers presented at the Soviet-American Library Seminar (1st) Washington, DC., May 4-6, 1979. For related documents, see IR 007 541-547. Text in Russian and English.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

An objective description of the programs and outline of the problems of the Lenin State Library are presented by I.S. Osipova of the Lenin State Library of the USSR, and a comparison between that library and the Library of Congress (LC) is presented by Frank M. McGowan. The Lenin Library serves as national library of the USSR, state repository of domestic and foreign printed materials, cultural information center, center for selected bibliography and interlibrary loan, research center in library science, and methodological and consultative center for Soviet libraries. Osipova discusses these functions in detail and notes that the library's information work deals with reference services, preparation of information sources, and the establishment of reference tools. The centralization and branch-networks of the Soviet libraries are stressed, and problems are briefly mentioned. In commenting on this paper, McGowan notes Osipova's avoidance of controversial issues and subjectively compares the Lenin Library and LC. The most significant difference is that the former is an officially designated national library, with broadly defined responsibilities, while the latter is not. The national responsibilities and services of both libraries are contrasted, and problems concerning growth of staff, space allocation, and collection development are noted.

ED-176 721 Not available NTIS
The Role of Libraries in the Satisfaction of Information Needs of Specialists. Reaction Paper by M. S. Day,
I. K. Kirpicheva. May 79, 55p
Papers presented at the Soviet-American Library Seminar (1st) Washington, DC., May 4-6, 1979. For related documents, see IR 007 541-547. Text in Russian and English.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

In describing the role of Soviet libraries in the satisfaction of information needs of specialists, I.K. Kirpicheva has provided a comprehensive picture of the extensive system for the State System Scientific and Technical Information (SSSTI) in support of the accelerated development of Soviet science and technology. Information needs arising at various stages of research and in the practical realization of scientific and technological developments are classified as needs satisfied mainly through information services, through library services, or through informal channels; improvement of services to the information user is accomplished through a cooperative information network along with the utilization of library science user research. A centrally controlled, national integrated plan underlies the information network with a set of unified principles and standards covering all levels of information transfer. In a reaction paper, M.S. Day, Director of the National Technical Information Service, notes the comprehensiveness of the SSSTI plan but questions the formal structure linking and cross-linking the libraries regarding possibilities for change. In addition, Day probes different usages of formal and informal communication channels in the USSR and the United States and asks for elaboration of other problems.

ED-176 722 Not available NTIS
The Soviet Library System and Its Planning. Reaction Paper by Alphonse F. Trezza,
V. V. Serov. May 79, 55p
Papers presented at the Soviet-American Library Seminar (1st), Washington, DC., May 4-6, 1979. For related documents, see IR 007 541-547. Text in Russian and English.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

The mechanics of the Soviet library system, the availability of libraries to the citizenry, organizational components, and the development and planning principles of librarianship as they follow Leninist national policy are discussed in this paper by V.V. Serov, Head of the Main Library Directorate, USSR Ministry of Culture. A program of library system construction within the socialist state designed by V.I. Lenin stresses the role of libraries in disseminating knowledge and politically educating the working people. The Decree of the Central Committee of the Communist Party of the Soviet Union further developed the library's role and centralized the library network structure. State control ensures the availability of library services to all Soviet citizens, beginning with public libraries and extending to specialized facilities for scientific and technical professionals. The State oversees the centralized library network, providing equipment and techniques, methodological and research activities, library construction, and preparation of library staff. Problems still exist with centralized acquisition, the preparation of library personnel, and the improvement of the material and technical base of many libraries. In a comment paper, Alphonse Trezza, Executive Director of the National Commission on Libraries and Information Science, discusses library service and future planning implications in the United States as compared with the Soviet library system.

ED-176 725 Not available NTIS
New Jersey State Library, Trenton. Library Development Bureau.
The Feasibility of Implementing an Online Data Base Search Service in the New Jersey Library Network. Phase II: Patterns of Service in Periodical Information Requests in the Area Libraries of New Jersey,
Joy K. Moll. Aug 78, 178p
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

This study of periodical interlibrary loan in New Jersey focuses on access to and sharing of periodical information in the state-wide library networks and investigates the feasibility of providing online search services for such information. The three part study began with a survey of the library literature dealing with networking and an examination of the library network plans of 13 states including New Jersey. A chart comparing aspects of nine state plans and a summary and evaluation of individual state plans are included. The second part of the study involved data gathering in ten libraries in the New Brunswick area for the availability of periodicals and for periodical article interlibrary loan statistics for 1976. Percentages of interlibrary loan requests for periodical articles were examined for local public libraries, academic libraries, and two area libraries. Conclusions and recommendations from the literature search and data gathering, which are presented in the third part of the study, indicate a cost-benefit analysis of online service in area libraries, along with the collection of more complete and accurate management information for information service from periodicals. Appendices include the interview guide, photoduplication request form, and the Phase I study.

INIS-mf-4724 PC **A02**/MF **A01**
Institutt for Atomenergi, Kjeller (Norway).
Institutt for Atomenergi: Annual Report 1976. Activities 1976.
20p
In Norwegian.
U.S. Sales Only.

The objective stated at the foundation of Institutt for Atomenergi was to carry out research and experimental and related activities with a view to the exploitation of atomic energy. Atomic energy was in this connection taken to include isotope technology, radiation chemistry and solid state physics in addition to nuclear power technology, and, in recent years the techniques and abilities acquired have to an increasing degree been applied in the fields of general energy technology, process technology and special environmental and resource technology. The activities in these fields in 1976 are presented under the section headings: Nuclear power; Energy technology; Process technology; Special environmental end resource technology; Isotope supply and irradiation service; Fundamental research in physics; General technical institute functions. (Atomindex citation 11:500556)

N80-26255/3 PC **A05**/MF **A01**
Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
La Recherche Aerospatiale, Bimonthly Bulletin Number 1979-6.
1979, 92p ESA-TT-632, ONERA-NT-1979-6
Transl. into English of la Rech. Aerospatiale, Bull. Bimestriel (Paris), No. 1979-6, Nov. - Dec. 1979 p 346-409. Original French Report Available from Onera, Paris Ff 36. Prepared for Esa.

No abstract available.

PB80-191323 CP **T08**
Council on Environmental Quality, Washington, DC.
UPGRADE: User Prompted Graphic Data Evaluation System.
Software,
Laurance J. Milask, and Steven Sylvester. 17 Apr 80, mag tape EPA/DF-80/006
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB-296 719, and PB80-191331.

UPGRADE is a general graphic and statistical analysis system for use with numeric data bases. It operates in an interactive-conversational mode, employing English-language prompts and responses. The system has been used as an analytic tool in various federal studies of environmental and health data. UPGRADE analytical capabilities include interactive x-y axis plots, histograms, coordinate maps, statistical analysis via an interface with the Statistical Analysis System (SAS), and numerous data manipulation and summarization routines. Interfaces are provided for several types of environmental and environmental health data, including EPA STORET water quality, EPA SAROAD air quality, USGS NASQAN water quality and an extensive integrated data base for health, demographic and environmental quality data. Selected CEQ-developed data bases will be made available in the near future. Software Characteristics: written for the IBM 370, VS operating system. 90% Fortran, 10 Assembler used for systems level facilities. IBM SORT utility used. Object code is supplied. Minimum of 500 K core required. When SAS is attached, CORE may expand beyond 500 K. Approximately 5172 tracks of on-line disk space required. There are 219 programs (subroutines) in the system.

PB80-191331 PC **A13**/MF **A01**
Sigma Data Computing Corp., Washington, DC. Information and Scientific Applications Div.
UPGRADE User's Manual for Use with UPGRADE Version 4.0,
Laurance J. Milask, Carol Gevecker Graves, and Mark L. Feldman. Jan 80, 297p EPA/DF-80/006A
Contract EQ7AC003
For system on magnetic tape, see PB80-191323.

UPGRADE is a general graphic and statistical analysis system for use with numeric data bases. It operates in an interactive-conversational mode, employing English-language prompts and responses. The system has been used as an analytic tool in various federal studies of environmental and health data. UPGRADE analytical capabilities include interactive x-y axis plots, histograms, coordinate maps, statistical analysis via an interface with the Statistical Analysis System (SAS), and numerous data manipulation and summarization routines.

PB80-194665 PC **A03**/MF **A01**
Environmental Protection Agency, Research Triangle Park, NC. Monitoring and Data Analysis Div.
Engineering Reference Manual for Coding NEDS (National Emissions Data System) and EIS/P and R (Emission Inventory Subsystem/ Permits and Registration) Forms.
Apr 80, 41p EPA-450/4-80-007

This manual provides specific engineering guidance and background information for the evaluation and reporting of source/emissions data in NEDS or EIS/P&R format. The manual is designed to assist coders of NEDS and EIS/P&R data who may not be familiar with a wide variety of industrial processes. It summarizes the purpose and organization of the manual. It also presents general coding instructions to supplement those given in other NEDS and EIS/P&R technical references, and presents general guidance regarding the use of NEDS Source Classification Codes (SCCs).

PB80-195910 PC **A19**/MF **A01**
Environmental Research Center, Research Triangle Park, NC.
Publications Bibliography, 1971-1979. Environmental Research Center - RTP.
May 80, 435p EPA-600/9-80-027
See also report dated Apr 77, PB-268 115.

The report, a bibliography, lists published articles authored by the staff of the four Laboratories comprising EPA's Environmental Research Center, Research Triangle Park, NC. These are the Environmental Monitoring Systems Laboratory, the Environmental Sciences Research Laboratory, the Health Effects Research Laboratory, and the Industrial Environmental Research Laboratory. The Bibliography, inclusive for the period January 1971-December 1979, includes some citations predating EPA's creation (December 1970). The Bibliography consists of a Key Word-in-Context Index, an Author Index, and a Publication Citations section.

PB80-197916 PC **A10**/MF **A01**
Acurex Corp., Mountain View, CA.
Environmental Assessment Data Systems: Terminology Reference Manual.
Final rept. May-Nov 79,
R. J. Larkin, and B. Ballard. Feb 80, 225p EPA-600/8-80-011
Contract EPA-68-02-2699

The report is a general reference manual on the terminology used to enter and retrieve information from the Environmental Assessment Data Systems (EADS), a group of interrelated computerized data bases that describe multimedia discharges from energy systems and industrial processes. The EADS was designed to aid researchers in environmental assessment, source characterization, and control technology development. The report contains the standard nomenclature or terminology used to describe certain data categories in the waste stream data bases. To selectively retrieve data from the waste stream data bases, consistent terminology must be used if the computer search is to obtain an exact match. The report contains terminology to be used to categorize sources, describe control technology, identify chemical compounds and elements, describe analytical methods in sample analysis, and list other data. The terminology applies to particle, gas, liquid, and solid discharge effluent streams.

PB80-199805 PC **A08**/MF **A01**
Radian Corp., Austin, TX.
The Revised Organic Chemical Producers Data Base System.
Interim final rept.,
G. E. Wilkins, C. H. Tucker, and E. D. Gibson. Jul 80, 172p RAD-TN-200-223, EPA-600/2-80-164
Contract EPA-68-03-2623

This report describes the revised Organic Chemical Producers Data Base (OCPDB), an automated chemical information system developed for the U.S. Environmental Protection Agency (EPA). Improvements have been made in two ways: (1) expansion of the data base to include more chemicals and more information about each and (2) implementation of the system through a data base management system. The revised data base includes almost 600 chemicals and more than 1300 producers. Chemicals are described by Chemical Abstracts Services (CAS) registry number, Wiswesser Line Notation (WLN), industrial process descriptions, chemical uses, synonyms, toxicity, economic data, and producers. Priority Pollutants identified as a result of NRDC vs. EPA are marked and process descriptions are cross-referenced with another EPA reference source, The Industrial Process Profiles for Environmental Use (IPPEU). Locations of producers are described by city, state, EPA region, and river basin. The chemicals produced at each location are listed, along with nameplate capacities, when available. Retrieval is possible through use of 'key' data elements: chemical name, synonyms, OCPDB number, CAS numbers, WLN, priority pollutant markers, process ID number, IPPEU numbers, producer company name, parent company name, city, state, river basin, and EPA region.

PB80-204308 PC **A06**/MF **A01**
Touche Ross and Co., Washington, DC.
Summary of Management Processes and Information Requirements for the Office of the Federal Inspector's Management Information System. Task 1 Report.
Final rept.
1 Apr 80, 121p OFI-80/2
Contract OFI-79-16279579

The report contains detailed planning for the joint American-Canadian project called ANGST, the Alaska Natural Gas Transportation System. The information requirements and management processes can assist in setting up a management information system.

5C. Economics

BTHE-010136 PC**$163.00**
British Standards Institution, Hemel Hempstead (England). Technical Help to Exporters.
Survey of Electrical Safety Requirements for Office Machines in Switzerland.
Apr 78, 31p
Price to members $125.00.

The survey outlines the general situation relating to electrical equipment and the particular situation relating to technical requirements for office machines in Switzerland. The information has been selected from THE's data bank and is believed to be correct at the date shown on the title page. The report is presented in sections as follows: A brief outline of the equipment approval and installation practice; a section entitled 'Organizations and their Functions', itemizing the various authorities either responsible for the issuing of technical requirements or for the enforcing of them; a summary, entitled 'Regulations and Technical Requirements', of the relevant official general national requirements relating to equipment and installations existing; a schedule giving, in tabular form, the standards national and international which are applied in the country for the equipment under review and also to major components thereof. The schedule shows whether approval in each country is 'compulsory' by law or 'voluntary'.

N80-26109/2 PC **A08**/MF **A01**
Western Union Telegraph Co., Upper Saddle River, NJ.
The 30/20 Ghz Net Market Assessment.
J. C. Rogers, and P. Reiner. Feb 80, 151p
NASA-CR-159837
Contract NAS3-21359

By creating a number of market scenarios variations dealing with network types, network sizes, and service price levels were analyzed for their impact on market demand. Each market scenario represents a market demand forecast with results for voice, data, and video service traffic expressed in peak load megabits per second.

N80-26198/5 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Cost Estimating Relationships for Airframes in the Development and Production Phases.
D. G. Eide. Jun 80, 50p NASA-TM-80229, L-13297

Cost estimating relationships are presented along with their statistical properties for the development phase and production phase for aircraft airframe programs. These relationships were derived for the engineering, tooling, manufacturing, and materials subdivisions of work during each phase. Cost estimating relationships are also presented for development support and flight test operations during the development phase. The purposes of the separation of costs by phase and by subdivision of work are to obtain better discounted dollar comparisons of different aircraft vehicles, to estimate the costs of vehicle programs with limited production requirements, and to evaluate the impact of technology advances affecting different subdivisions of work in different phases of the vehicle program.

PB80-189822 PC **A05**/MF **A01**
Council of State Planning Agencies, Washington, DC.
The Capital Budget.
Studies in State Development Policy rept. no. 9 (Final),
Robert Devoy, Harold Wise, and Joan Towles. c1979, 83p ISBN-0-93482-08-6, EDA-ERD-80-153
Grants EDA-OER-553-G-78-21, EDA-99-7-13360.1

The report analyzes the economic impact of state capital spending and suggests new ways for states and local areas to ensure that their public facility investments promote a state's economic development. The central purpose of a state's capital budget is to guide the overall allocation of state expenditures for public facilities. To ensure that capital expenditures are firmly rooted in the state's overall priorities, the public facility plan should be part of a comprehensive state development strategy where economic development is but one component along with education and health care, energy, natural resources, and many others. The report is a guide for state officials and others who need to understand better how state investments impact an economy so that they can direct their investment decisions to produce the desired economic consequences.

PB80-191562 PC **A09**/MF **A01**
Citizens Policy Center, Santa Barbara, CA.
The Entrepreneur's Guide. Open Road/New Enterprises Program.
Final rept. Jun 76-Apr 78.
Jun 80, 177p EDA-80-085
Grant EDA-99-6-09541

The technical assistance study parallels the process model for enterprise development. This process is a guide for any business development effort and may be completed in between three and nine months. The project has dual public and private goals of training and profit. This approach allows for a very realistic working and training environment and promotes fund raising efforts and investments in the public and private sectors. As a result, the project is involved in a profit and non-profit structure. The New Enterprises Program represents an attempt to address the issue of structural youth employment. The strategies are complex and multifaceted.

PB80-192826 PC **A03**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. International Economics Div.
Price Transmission Between the U. S. Gulf Ports and Foreign Farm Markets.
Staff rept.,
H. Christine Collins. Jan 80, 42p

Perfect price transmission is often used as a convenient simplification in models measuring elasticity of foreign demand. This paper employs the UN-FAO data base of internal farm prices for wheat, corn, and soybeans in selected countries and the U.S. Gulf Ports price for these respective commodities as a measure of world price to show price transmission from the world market to the farm in these countries under several model specifications.

PB80-193048 PC **A03**/MF **A01**
Office of Management and Budget, Washington, DC.
Equitable Tax Treatment of United States Citizens Living Abroad.
24 Jan 80, 27p

The United States is the only major industrialized country which taxes on the basis of citizenship. Consequently, income taxation is the focus of this report. The foreign countries whose laws are considered are Canada, France, Germany, Japan, and the United Kingdom.

PB80-193055 PC **A03**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. National Economics Div.
The Food Marketing Cost Index: A New Measure for Analyzing Food Price Changes.
Staff rept.,
Harry H. Harp. May 80, 28p

The paper presents cost indexes of inputs used in food processing, wholesaling, and retailing. Indexes are presented for costs of labor, packaging materials, transportation services, advertising, fuel and power, other utilities, rent, maintenance and repair, business services, property taxes and insurance, supplies, and interest. Data sources and methodology used in constructing the indexes are presented.

PB80-193287 PC **A04**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. International Economics Div.
The Implications of Imperfect Competition Theory Applied to International Commodity Markets on Policy Analysis.
Philip L. Paarlberg. 30 Apr 80, 69p

Most empirical models of world agricultural commodity markets initially assume a competitive market and then introduce trade barriers into the model. This research reviews several theoretical models of imperfect competition, which when applied to international commodity markets demonstrate that the assumption of market structure is critical in determining the impacts of a policy change upon the market equilibrium and welfare distribution. Further this analysis explicitly recognizes the impact of retaliatory trade policies on market equilibrium and welfare.

PB80-193485 PC **A05**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. National Economics Div.
The Demand for Fresh Winter Cucumbers and Green Peppers in U. S. Regional Wholesale Markets.
Staff rept.,
Ernest B. Smith. Jan 80, 97p

The demand for fresh winter cucumbers and green peppers in U.S. regional wholesale markets is estimated by a price dependent, pooled cross-sectional time-series model utilizing dummy variables to allow regional and monthly variations. Demand for both commodities was found to vary by region of the country and month of the season. Wholesale prices were found to be inflexible and farm level prices potentially flexible for both commodities. The influence of income on cucumber and green pepper prices was found to vary in sign as well as magnitude between regions, being negative in the Southeast, Great Lakes, Lower Midwest and West regions, and positive in the Northeast and Upper Midwest regions.

PB80-193568 PC **A06**/MF **A01**
California Energy Commission, Sacramento.
The Comparative Effects of Energy Technologies on Employment.
Staff rept. (Final),
Lionel J. Lerner, and Frederick H. Posey. Nov 79, 122p CAEC-56, CAEC-700-79-011

This study analyzes the relative contribution of nuclear, coal, and oil power generation technologies, the addition of insulation to existing residences and solar water heating to overall state and national job opportunities. Direct, indirect, and induced jobs which result from the constructing and operation of these alternative energy technologies are compared in terms of equivalent costs and equivalent energy produced or conserved. Employment per dollar of expenditure for each energy technology is also compared to employment per dollar in other broad sectors of the economy.

PB80-193717 PC **A02**/MF **A01**
California Energy Commission, Sacramento.
Estimating Utilities' Prices for Power Purchases from Alternative Energy Resources.
Staff rept. (Final),
William B. Marcus, and Robert B. Weisenmiller. Mar 80, 20p CAEC-61, CAEC-500-80-015

This report presents estimates of present and forecast prices of energy and generating capacity based on existing Energy Commission, Public Utilities Commission, and utility data for use by consulting engineers, economists, and others preparing feasibility studies.

PB80-194145 PC **A10**/MF **A01**
Ontonagon County Board of Commissioners, MI.
Economic Development Action Plan and Strategy for Ontonagon County, Michigan.
Dec 79, 224p EDA-80-081
Grant EDA-06-09-01495
Prepared by Michigan Technological Univ., Houghton, MI. Bureau of Industrial Development.

The overall objective of this Title IX Economic Action Plan and Strategy project was to develop a program consisting of a number of activities that could result in a more self-sustaining, larger and more stable economic base on which the citizens of Ontonagon County could improve the security and quality of their lives. Recommendations for accomplishing these objectives are based on programs developed from the County's resources by specifying opportunities that would lessen the County's dependence on copper mining. Implementation of the results of the study will expand and strengthen the tourism, natural resource and manufacturing components of the County's economic base.

PB80-194251 PC **A02**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. National Economics Div.
Current Cost of Operating Refrigerated Trucks for Hauling Fresh Fruits and Vegetables by Multi-Truck Firms.
Staff rept.,
Patrick P. Boles. Dec 79, 24p

Current cost per mile for operating refrigerated trucks to haul fresh fruits and vegetables are developed. Costs were originally developed in 1976 using a synthetic cost analysis and were updated to 1979 using indexes of other sources. Cost per mile tended to decrease as trip lengths increased and total annual mileage increased. Cost increased 37 percent between 1976 and July 1979. Fuel prices increased 70 percent while all other items increased 29 percent.

PB80-194269 PC **A10**/MF **A01**
Futures Group, Inc., Glastonbury, CT.
Corporate Strategies of Automotive Manufacturers. Volume II: A Comprehensive Summary of Likely Actions by Domestic Companies Under Fuel-Economy Regulations: 1978-1985.
Final rept. Oct 77-Nov 78,
Harold S. Becker. Nov 78, 217p DOT-HS-804-915
Contract DOT-HS-7-01784
See also Volume 1, PB80-106123.

The study is centered on helping NHTSA reach an understanding of the likely strategic actions that will be taken by automotive manufacturers in the presence of legislation and regulation designed to achieve improvement in automotive fuel economy. Many factors in addition to the fuel-economy standards are at play that will affect the strategies of the automotive manufacturers. These other factors include economic conditions in the United States, demographic shifts, changing social attitudes, and other forms of legislation (e.g., emission and safety standards) directed at the design and use of automobiles in the United States. The socio-economic scenario portrayed is a composite based upon long-term forecasts of economic growth. An industrial dynamics model was used to project total demand for automobiles. Also, a model was constructed to simulate consumer response to the various automotive companies. That model was based upon historical factor analysis of new-car purchases and was used to project market shares of each company. Another model was built and used to estimate the strategies each company would choose for meeting the fuel-economy standard. Results of all of these efforts then were used for a financial analysis of the firms, which resulted in the projections shown here of the financial indicators for each of the automotive companies.

PB80-195159 PC **A02**/MF **A01**
Cornell Univ. Agricultural Experiment Station, Ithaca, NY. Dept. of Rural Sociology.
Development Indicators for Substate Planning and Development Districts of the Northeast.
Ward W. Bauder. Jul 79, 24p SEARCH AGRICULTURE-2-80
Also pub. as ISSN-0362-2754.

Five unidimensional scales measuring the institutional features of the 300 counties and 94 substate planning and development districts in the Northeast were factor analyzed with a series of aggregate measures to produce component indices of three dimensions of development: economic resources, equality, and institutional differentiation. Maps of the 94 districts show the patterns of distribution of each dimension for 1950, 1960, and 1970. Distribution patterns change over time, indicating a dynamic interrelationship of development dimensions. The importance of including the structural dimension in planning and evaluating development programs is illustrated.

PB80-196058 PC A21/MF A01
Siouxland Interstate Metropolitan Planning Council, Sioux City, IA.
Siouxland Economic Adjustment Strategy.
Final rept.
May 80, 496p EDA-80-091
Contract EDA-05-09-01788
Prepared in cooperation with Economics Research Associates, Los Angeles, CA.

Economics Research Associates (ERA) has been assigned by the Siouxland Interstate Metropolitan Planning Council (SIMPCO) to provide consultation on the seven county Siouxland economic adjustment strategy. This program was begun in order to resolve economic problems which developed in recent years. The readjustment program was authorized by a consensus of civic and business leaders throughout the region in order to reverse the employment trends, work stoppages, personal income trends.

PB80-197288 PC A03/MF A01
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
The Southeastern Trade Adjustment Assistance Center, Atlanta, Georgia.
Annual rept. no. 1 (Final).
Sep 78, 35p EDA-80-092
Grant EDA-99-26-09892

The Southeastern Trade Adjustment Assistance (TAAC) was established to provide assistance to domestic firms in the region which have been impacted by direct competition with foreign imports. The Southeastern Trade Adjustment Assistance Center is operated by the Engineering Experiment Station, a unit of the Georgia Institute of Technology. The service region includes the states of Florida, Georgia, Alabama, Mississippi, Tennessee, Kentucky, North Carolina, and South Carolina. Overall, the Southeastern TAAC has provided effective petition assistance to firms on a timely basis mainly because of the network of participating EDA University Centers and the pool of professionals working for the Engineering Experiment Station. The majority of the 56 firms receiving some form of certification assistance from the TAAC resulted from recent, improved outreach efforts.

see individual report for order number and price
International Customs Tariffs Bureau, Brussels (Belgium).
International Customs Journal. Year 1979-1980.
Bulletins.
1979-80,open series
See also 9th Edition, PB-280 265.

The reports present authoritative information for exporters, importers, investors, manufacturers, and those concerned with international trade. They contain the schedules of customs duties and exemptions applicable to goods imported into or exported from the country. Other individual documents are also available:

BULL-53. Malta. 9th ed, suppl-1, Apr 80, 31p, suppl. to PB-280 265, PC A03, MF A01 **PB80-198716**

PB80-198773 PC A05/MF A01
Michigan Univ., Ann Arbor. Highway Safety Research Inst.
Retail Price Distribution of Alcoholic Beverages for On-Premise Consumption in Michigan.
Final technical rept. Oct 78-Sep 79,
R. L. Douglass, P. Barkey, A. Wagenaar, and P. deBiasi. Apr 80, 92p UM-HSRI-80-35
Sponsored in part by Michigan Dept. of Public Health, Lansing. Office of Substances Abuse Services.

The report contains the results of a survey of Class C Bars and Taverns in Michigan. The objective of the study was to measure the price of drinks by-the-glass and to identify the correlates and determinants of price levels. Price was conceptualized to represent the basic component of economic availability of beverage alcohol. Greater price variation than expected was found for most drinks containing distilled spirits and for wine. Beer was consistently the least costly and most uniformly priced. Analyzed and discussed are effects of price incentives, degrees of urbanism, food services, other establishment characteristics, and associations between county-level average prices and selected alcohol-related health and social problems. Policy and research recommendations are offered.

PB80-198849 PC A07/MF A01
Loring Readjustment Committee, Caribou, ME.
Loring Readjustment Committee Economic Impact Area Adjustment Plan, Caribou, Maine.
May 80, 133p EDA-80-089
Grant EDA-01-09-01929

The primary objective of this one-year grant to the Loring Readjustment Committee (LRC), was to evolve and promote strategies and plans to reduce the area's economic dependence on the presence of Loring Air Force Base. The Executive Summary is designed with two thoughts in mind. First, to give the reader a non-detailed panoramic look at the full scope of recommended activities included, and, secondly, to facilitate quick location or more detailed writeups on those activities. The report also identifies proposed major activities within each sphere of the region's economy that, if pursued, represent what area people perceive to be the most promising avenues to economic growth, expansion and revitalization.

see individual report for order number and price
International Customs Tariffs Bureau, Brussels (Belgium).
International Customs Journal. Year 1979-1980.
Bulletins.
1979-80,open series
See also 5th Edition, PB-269 249, and 6th Edition, PB-251 740.

The reports present authoritative information for exporters, importers, investors, manufacturers, and those concerned with international trade. They contain the schedules of customs duties and exemptions applicable to goods imported into or exported from the country.

BULL-14. European Economic Community (E.E.C.). 8th ed, Mar 80, 291p, PC A13, MF A01 **PB80-199227**

PB80-199920 PC A04/MF A01
Economics, Statistics, and Cooperatives Service, Washington, DC. National Economics Div.
Farmer-to-Consumer Direct Marketing in Six States,
Peter L. Henderson, and Harold R. Linstrom. Jul 80, 52p AIB-436

Nearly 62,000 farmers in Indiana, Michigan, New Jersey, North Carolina, Ohio, and Pennsylvania sold about $260 million worth of farm products directly to consumers in 1978. Direct sales represented 2 percent of total farm income in the six States. Leading in sales value were floral and nursery products, apples, berries, peaches, sweet corn, tomatoes, and melons. Direct sales from the farmhouse was the most frequently used direct marketing method, followed by roadside stands. Other types of direct marketing outlets are pick-your-own operations, farmers' markets, house-to-house delivery and farm stores.

5D. History, Law, and Political Science

AD-A085 483/6 PC A07/MF A01
Air Univ Maxwell AFB AL
Background Information on the Soviet Union,
Kenneth R. Whiting. 1978, 140p Rept no. AU-7

This text is concerned primarily with the physical and human resources of the Soviet Union today and with its organization. The military and industrial powerhouse now facing us did not come into being in any mystical way; its present position is due to excellent natural resources, hard work, and skilled-albeit ruthless-organization. Because of limited space, the descriptive rather than the historical approach is used here; however, the historical chapter will help correct any imbalance. The reader should not regard the treatment of any subject touched upon in this text as definitive. The intent is rather to provide some background for a better understanding of the Soviet Union and to stimulate further study.

AD-A085 613/8 MF A01
American Univ Washington DC Foreign Area Studies
Cyprus: A Country Study.
Area handbook series, 3rd edition,
Eugene K. Keefe, J. Jeffrey Hoover, Donald D. Whitaker, Margarita Dolbert, and Sallie M. Hicks. Jul 79, 334p Rept no. DA-PAM-550-22
Supersedes report dated 1971, AD-725 431.
Availability: Superintendent of Documents, GPO, Washington, DC 20402, Stock No. 008-020-00831-1, HC$9.00. Microfiche furnished to DTIC (and NTIS) users.

The study is based on a variety of published and unpublished sources and on interviews with consultants having first hand knowledge of Cyprus and Middle Eastern affairs. Gaps and resulting problems of analysis remain for resolution by future scholars working with a broader range of data. Additionally, given the limits of time and space, some aspects of Cypriot society and culture have been treated sketchily or not at all. Brief comments on some of the more valuable sources, including those that provide amplification of detail or interpretation presented in a chapter, appear at the end of each chapter. Measurements are given in the metric system; a conversion table is provided to assist those readers who are unfamiliar with metric measurements. The authors have tried to limit the use of foreign and technical terms. These are briefly defined where they first appear in any chapter or reference is made to the Glossary included in an appendix for the reader's convenience. The authors also have attempted to follow standard spelling of Greek and Turkish words and phrases. Place-names are those established by the United States Board on Geographic Names in January 1953, with exceptions reflecting more current usage.

PB80-193782 PC A03/MF A01
Hawaii Univ., Honolulu. Water Resources Research Center.
The Enforcement of Consistency in Hawaiian Water Rights: An Introduction to 'Robinson v Ariyoshi'.
Technical rept.,
Williamson B. C. Chang. Jun 78, 32p TR-120, W80-05513, OWRT-A-074-HI(1)
Contract DI-14-34-0001-8013

One of the most critical questions regarding the future of water regulation in Hawaii is the validity of the Hawaii Supreme Court's decision in the landmark case of McBryde Sugar Co. v. Robinson. In that case, the state court overturned the assumption that surface waters in Hawaii could be privately owned. To the parties involved in the litigation, the decision came as a surprise and upset the basis for their claims to waters of the stream. As a result, the parties sought to have the results of the state supreme court decision nullified in federal court. Their efforts were successful, and in October 1977, the federal district court voided the state supreme court decision. This article challenges the validity of the federal court's decision. The question presented before the federal court was a novel and unique one.

PB80-199334 PC A03
Woods Hole Oceanographic Institution, MA. Marine Policy and Ocean Management Program.
Coastal Energy Impact Program Boundaries on the Atlantic Coast: A Case Study of the Law Applicable to Lateral Seaward Boundaries,
Donna R. Christie. 1979, 45p NOAA-80060204
Grant NOAA-04-8-M01-149
Pub. in Virginia Jnl. of International Law, v19 n4 p841-882 1979.

Within the U.S., speculation about the extension of the territorial sea to twelve miles and development of resources on the continental shelf recently have made interstate seaward boundaries important in questions of conflicts of laws and in allocation of funds under the Coastal Energy Impact Program (CEIP). This article attempts to survey the law applicable to lateral seaward boundaries and to

relate that law to the delimitation of CEIP boundaries on the Atlantic coast. For lateral seaward boundary determinations between adjacent states within the U.S., there appears to be no presumption in favor of the equidistance method created by domestic or international law.

PB80-812811 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Arms Control. 1978-June, 1980 (A Bibliography with Abstracts).
Rept. for 1978-Jun 80,
Edith Kenton. Jul 80, 126p
Supersedes NTIS/PS-79/0662 and NTIS/PS-78/0446. See also 1964-1977, NTIS/PS-79/0661.

The bibliography presents annotated references on the SALT - Strategic Arms Limitation Talks - negotiations and agreements, on defense policies, security affairs, nuclear energy and nuclear weapons, nonproliferation systems and Safeguards, Third World arms transfer and foreign military sales, balance of power, East-West relations, armed forces reductions, and deterrence and disarmament. (This updated bibliography contains 119 abstracts, 49 of which are new entries to the previous edition.)

5G. Linguistics

AD-A085 588/2 PC **A05**/MF **A01**
Bolt Beranek and Newman Inc Cambridge MA
Theoretical Studies in Natural Language Understanding.
Annual rept. 1 May 79-30 Apr 80,
W. A. Woods. May 80, 77p Rept no. BBN-4395
Contract N00014-77-C-0371

Central to being able to construct powerfully intelligent knowledge-based systems is the development of a representational system that is able to handle open-ended domains of knowledge. Critical to this effort is an understanding of the semantics of such notations, and more generally an understanding of the fundamental notions of 'semantics' and 'meaning'. This report addresses fundamental issues of semantics for computational systems. The question at issue is 'What is it that machines can have that would correspond to the knowledge of meanings that people have and that seem to refer to by the ordinary language term 'meaning'.' The proposed answer is that the notion of truth-conditions can be explicated and made precise by identifying them with a particular kind of abstract procedure and that such procedures can serve as the meaning bearing elements of a theory of semantics suitable for computer implementation. This theory, referred to as 'procedural semantics,' has been the basis of several successful computerized systems and is acquiring increasing interest among philosophers of language. (Author)

AD-A085 750/8 PC **A08**/MF **A01**
Illinois Univ At Urbana-Champaign Coordinated Science Lab
Computational Interpretation English Spatial Prepositions.
Doctoral thesis,
Lois Carolyn Boggess. Feb 79, 163p Rept no. T-75
Contract N00014-67-A-0305-0026

It seems clear to anyone who pays attention to the use of prepositions in language that any one preposition, when used to describe the spatial relationship between different objects can produce strikingly different mental models for different objects. The mental model produced by the description 'a bowl on a table' seems to be somewhat different from that produced by 'a poster on a wall' which in turn is somewhat different from 'a shelf on a wall' which again is different from 'a fly on a ceiling'. It is the contention of this paper that the preposition in conjunction with a small set of features of the objects (mostly perceptual features) can account for such variations in spatial relations. The thesis discusses a means of taking English-language descriptions involving prepositions and their semantic subjects and objects and deriving a three-dimensional model of the spatial relationships of the subject and object. The program takes extended descriptions involving many objects each of which is incorporated into the overall model. Once an object has been described, it is possible to interrogate the model about the relation of the object to any other in the model, without recourse to inference rules of the following kind: 'if A is on B and B is in C then A is (probably) in C'.

5H. Man-Machine Relations

AD-A085 604/7 PC **A03**/MF **A01**
Army Electronics Research and Development Command Fort Belvoir VA Night Vision and Electro-Optics Labs
Effect of Spatial and Temporal Video Image Compression on Military Target Detection.
Technical rept.,
Joseph E. Swistak. Apr 80, 30p Rept no. DELNV-TR-0010

A study was conducted which examined the effects of simultaneous spatial and temporal bandwidth compression on observer detection and recognition performance of military targets. Five levels of temporal (frame rate) and four levels of spatial (bits per pixel) were co-varied using a factorially designed experiment. Of special interest was any interaction effect between the two main variables. A total of 48 observers were divided in 4 groups of 12. Each group was presented a single spatial reduction level at all five temporal reduction levels. Statistical analysis revealed no significant differences in subjects' detection or recognition performances due to changes in the temporal rate at which information was presented. Changes in the spatial levels (resolution) did have a significant effect on both detection and recognition performance. Although significant differences in subject performance were noted due to the interaction of the two main variables, in-depth analysis revealed the interaction effect to be anomalous. The single most critical element of bandwidth compression appears to be spatial. (Author)

AD-A085 772/2 PC **A04**/MF **A01**
Naval Weapons Center China Lake CA
Review of Five Military Decision Aids.
Technical publication. Aug 79-Jan 80,
Michael J. Barnes. May 80, 66p Rept no. NWC-TP-6171

This report reviews decision-aiding approaches for military environments. Five aids were discussed: the DDI decision triangle, Perceptronic's ADDAM, Analytic's Nomograph displays, SKETCH models (ISC), and EWAR (Decision-Science Applications). A taxonomony was developed in order to compare the aids. Three characteristics of the aids were discussed in detail: type of decision tasks addressed, methods for incorporating conditioning elements, and the mathematical approaches used to develop the aids. The following trends emerged from the review. Determination of a single optimal action was not the primary purpose of most of the aids. Rather, the operator was given multiple decision criteria to help him structure the decision parameters in his own mind. Also, an attempt was made to reduce the amount of information displayed to the operator by integrating the information into concise formats. The mathematical approaches for generating the decision algorithms included: Bayesian statistics, pattern recognition models, dynamic and non-linear programming techniques and outcome calculators. (Author)

AD-A085 811/8 PC **A04**/MF **A01**
Threshold Technology Inc Delran NJ
Advanced Image Exploitation Aids.
Final technical rept.,
John R. Welch, and E. Shamsi. Mar 80, 63p
RADC-TR-80-74
Contract F30602-78-C-0177

This report describes the configuration and testing of a large vocabulary voice recognition system which could be used for image interpretation and intelligence report generation involving the creation of descriptive statements with unpredictable content and variable format. Recently, Threshold Technology developed an innovation in voice input technology which combines keyboard input with automatic voice recognition to provide accurate and rapid entry of a large vocabulary of words with no requirements for structuring the data entry process. This innovation, referred to as TALK & TYPE, is a system in which the user types the first letter of each word to be entered while he speaks the word into a word recognition device. The typed letter then activates only those vocabulary words which start with that letter, thereby greatly reducing the size of the working vocabulary and greatly increasing recognition accuracy and speed. (Author)

N80-26039/1 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
Head-Up Transition Behavior of Pilots During Simulated Low-Visibility Approaches.
R. F. Haines. Jun 80, 35p NASA-TP-1618, A-8057

Each of 13 commercial pilots from four airlines flew a total of 108 manual flight director approaches in a moving base simulation of a medium-sized turbojet (95,000 lb gross weight) which had a day and night Redifon external scene. Three levels of runway visual range (RVR) (1,600; 2,400; and greater than 8,000 ft), three wind-shear profiles, nine ceiling heights, and continuous and intermittent visibility after initial breakout were tested. The results indicated that: (1) mean decision time ranged from 2 to 4.6 sec for ceilings under 380 ft across the three RVR conditions; (2) mean vertical distance traveled during the visual-cue assessment period was a relatively constant proportion below the existing ceiling; (3) a significant three way interaction in mean decision time between wind shear, day-night, and ceiling RVR variables occurred; (4) mean number of head-up transitions to VFR conditions after breakout ranged from 4.6 to 13.4 and increased as a function of ceiling and severity of wind shear; the typical duration of fixation out the window was 1.5 sec; and (5) subjective pilot ratings of controllability and precision of control as well as amount of skill, attention, or effort required to make the landing were influenced significantly by the wind shear, night conditions, and low breakout ceiling conditions.

N80-26040/9 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
Flight-Deck Automation: Promises and Problems.
E. L. Wiener, and R. E. Curry. Jun 80, 27p
NASA-TM-81206, A-8210

The state of the art in human factors in flight-deck automation is presented. A number of critical problem areas are identified and broad design guidelines are offered. Automation-related aircraft accidents and incidents are discussed as examples of human factors problems in automated flight.

5I. Personnel Selection, Training, and Evaluation

AD-A085 396/0 PC **A03**/MF **A01**
Center for Naval Analyses Alexandria VA Inst of Naval Studies
A New Look at Success Chances of Recruits Entering the Navy (SCREEN),
Robert F. Lockman, and Philip M. Lurie. Feb 80, 40p Rept no. CRC-425
Contract N00014-76-C-0001

SCREEN is a table of chances of completing the first year of service used in qualifying applicants for enlistment. The chances are a function of educational level, mental group, age and dependency status. Because SCREEN was based on regular Navy recruits in 1973, it was updated on recruits and extended to reservists and women who enlisted in 1977. The 1977 regular and reservist SCREENs are compared with one another and with the 1973 version. A women's SCREEN is evaluated in light of current recruiting policy. A streamlined version of the 1973 SCREEN is presented, along with a cost-benefit analysis of the qualifying score. (Author)

AD-A085 508/0 PC **A05**/MF **A01**
Washington Headquarters Services (DoD) DC Directorate for Information Operations and Reports
Department of Defense Distribution of Personnel by State - By Selected Locations as of September 30, 1979.
30 Sep 79, 83p

This publication is based on data submitted by the Military Departments and Defense Agencies under Department of Defense instructions for reporting of personnel by operating location. Operating location is defined as the locale (geographic location) where military or civilian employees of the Department of Defense are physically located for the performance of duties. Within states, the major concentrations of personnel are shown by city or installation location. However, in a few locations, the Military Departments report personnel at a parent installation rather than at their operating location. Such variations tend to occur in metropolitan areas where military activities are scattered physically among multiple political jurisdictions or corresponding subareas. Personnel on limited TDY on September 30, 1979, may be reported at their assigned location. Special attention is called to the following: (1) Department of the Army civilians for each state include Corps of Engineers Civil Functions personnel as well as National Guard Technicians; (2) Data for Department of the Navy military personnel includes Marine Corps military personnel. Navy personnel consist of shore-based military personnel only and exclude afloat and temporary shore-based military personnel; and (3) Not included in the civilian personnel data are 10,990 special youth employees not subject to statutory limitations (largely 'Stay-in-School') most of whom are part-time employees. Of these, 1,065 were located in the Washington Metropolitan Area.

AD-A085 600/5 PC **A04**/MF **A01**
Navy Personnel Research and Development Center San Diego CA
Methods to Evaluate Scales and Sample Size for Stable Task Inventory Information.
Final rept. Feb 77-May 79,
John J. Pass, and David W. Robertson. May 80, 72p Rept no. NPRDC-TR-80-28

Methods were developed to determine: (1) the stability and redundancy of responses to two job scales--the continuous Relative Time-Spent scale and the dichotomous Task-Performed scale, (2) the stability of 'job types' (i.e., clusters of job incumbents) derived from scale responses, and (3) the change in stability when sample size is reduced. Results indicated that the Task-Performed scale yields stable, meaningful task information (i.e., percentages of personnel performing tasks) from responses by job incumbents, but no practical gain in information is achieved from the Relative Time-Spent scale. A better way to collect time-spent data is proposed. Findings also demonstrate that highly stable scale data and cluster solutions are obtainable from samples substantially smaller than those presently administered. The study's empirically developed relationship between sample size and stability can be usefully employed to determine cost-effective sampling for task inventory surveys. (Author)

AD-A085 609/6 PC **A03**/MF **A01**
Air Force Human Resources Lab Brooks AFB TX
Computer-Assisted, Programmed Text, and Lecture Modes of Instruction in Three Medical Training Courses: Comparative Evaluation.
Final rept.,
Gerard M. Deignan, Brent R. Seager, Michael Kimball, and Neil S. Horowitz. Jun 80, 33p Rept no. AFHRL-TR-79-76

The present study of 700 medical trainees in three different career fields was conducted to reduce the data gap in medical training on the following major questions: (a) Do computer-assisted instruction, programmed text, and lecture differ in instructional effectiveness. (b) Do learners who differ in characteristics (e.g., aptitude and motivation) achieve more in less time under computer-assisted instruction, programmed test or lecture. Computer-assisted instruction was demonstrated to be more effective in less time than programmed text or lecture; however, aptitude, course, and learner characteristics interacted with achievement and time criteria. Learner characteristics profiles of high-fast and low-slow achievers in each condition were provided to facilitate decisions about alternative instructional assignments. (Author)

AD-A085 610/4 PC **A02**/MF **A01**
Air Force Human Resources Lab Brooks AFB TX
Application of Backward Chaining to Air-to-Surface Weapons Delivery Training.
Interim rept. May-Sep 78,
Jon Bailey, Ronald G. Hughes, and William E. Jones. Apr 80, 25p Rept no. AFHRL-TR-79-63

Experienced pilots acquired a 30-degree dive bombing task in the Advanced Simulator for Pilot Training (ASPT). Half the subjects acquired the task under a 'whole task' approach; half under a 'backward chaining' approach. Criterion performance was defined in terms of circular bomb error. The results indicated that subjects in the backward chaining group performed significantly better than subjects in the whole task group when training time for the two groups was equated. The results demonstrate that backward chaining may be used to significantly enhance the effectiveness of simulator-based instruction on a sequential task such as manual dive bombing. The results provide an important demonstration of the appropriateness of basic learning theory principles and techniques for generating effective instructional approaches utilizing the unique capabilities of the flight simulator. (Author)

AD-A085 648/4 PC **A03**/MF **A01**
Human Resources Research Organization Alexandria VA
Performance Proficiency of Automotive and Turret Mechanics in Malfunction Diagnosis and Repair.
Consulting rept.,
William C. Osborn. May 66, 32p
Contract DA-44-188-ARO-2

This report describes a project to develop and administer job sample tests for diagnostic ability in selected maintenance MOSs and to relate the results to the following factors: (1) number of recommendations for replacement of parts, components, or major assemblies erroneously condemned; (2) type of maintenance training, amount of experience, and current job assignment; (3) use of essential procedures, test equipment, and technical manuals; and (4) content of school programs in the MOS field under review. Resulting data on test performance, vehicle components erroneously condemned, and performance deficiencies are presented. (Author)

AD-A085 658/3 PC **A04**/MF **A01**
Resources Research Corp College Station TX
Air Force Enlisted Personnel Retention-Accession Model.
Final rept.,
Thomas R. Saving, Raymond C. Battalio, Arthur S. De Vany, Gerald P. Dwyer, and John K. Kagel. Jun 80, 65p AFHRL-TR-80-12
Contract F33615-78-C-0049

This report presents the methods of analysis and results of an effort designed to develop a methodology for explaining Air Force accessions and retentions. The analysis was conducted in three stages. First, the life-cycle model of the enlistment decision originally developed in a previous contract was extended and clarified. Second, a new data set was developed. These data are described extensively and plotted to reveal its relation to significant institutional changes that occurred over the 1957 to 1978 period. The data were then used to estimate accession supply equations for each sex, race, and AFQT category. Third, two new theoretical developments are presented. The first of these develops a model of the enlisted force by skill group. The second utilizes the theory of economic dynamics to simulate the adjustments of the enlisted force to changes in pertinent variables. (Author)

AD-A085 659/1 PC **A04**/MF **A01**
Texas Christian Univ Fort Worth Inst for the Study of Cognitive Systems
Validity of Learning Strategies/Skills Training.
Final rept.,
Donald F. Dansereau, Charles D. Holley, Karen W. Collins, Larry W. Brooks, and Barbara McDonald. Apr 80, 68p AFHRL-TR-79-84
Contract MDA903-76-C-0218, ARPA Order-3204
See also Rept. no. AFHRL-TR-75-41, AD-A014 722.

Research has documented that most students tend to employ inefficient or less-than-effective methods for acquiring, retaining, retrieving, or applying information. To acquire, retain, and appropriately apply knowledge, it has become evident that methods designed to organize information for presentation to learners are of beneficial, yet limited, effectiveness. In contrast, strategies which the learner finds useful in transforming information through personal effort are likely to be 'owned,' retained, and contribute to increased performance. Programmatic research was initiated to (a) identify and compare the effectiveness of alternative learning strategies upon learner performance, (b) incorporate effective strategies and interactive practice materials within a systematic training program, and (c) empirically validate the performance of strategies-trained and untrained students. Some of the strategies included have been (a) various mnemonic devices, (b) imagery elaboration, (c) paraphrasing, (d) visual networking, (e) goal-setting, (f) distraction desensitization, and (g) formal peer interaction.

AD-A085 660/9 PC **A03**/MF **A01**
Decisions and Designs Inc McLean VA
Development of a Computerized Training Requirements and Cost Evaluation System for the U.S. Marine Corps.
Semi-annual rept.,
Michael L. Donnell, and Leonard Adelman. May 80, 41p Rept no. PR-80-10-315
Contract MDA903-80-C-0195, DARPA Order-3859

This semi-annual report describes efforts to develop a resource management system for U.S. Marine Corps combat units and represents a step toward achieving that difficult goal. Specifically, this report delineates the conceptual framework and technical characteristics for the prototype benefit-cost model and accompanying computer software (called CTRACES) being developed for the Marine Corps Training Requirements and Cost Evaluation System (TRACES). CTRACES is designed to help battalion commanders develop a cost-effective strategy for remedial training. They will be able to identify how many points and what percentage of the Marine Corps Combat Readiness Evaluation System (MCCRES) deficit their battalion can be expected to make up for the best package of remedial training options at a specific dollar level of cost. In addition, battalion commanders will be able to evaluate the expected benefit and cost of particular training packages that they, or others, have proposed for consideration.

AD-A085 675/7 MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Volume I.
Final rept.
31 Aug 74, 87p
Contract N00014-69-C-0246
See also Volume 2, AD-A085 676.
Availability: Microfiche copies only.

The study objective consisted of a determination of what the health care personnel in the Navy's Medical Department, Bureau of Medicine and Surgery actually do in their occupations; improving the personnel process (education and training); and building a viable career pathway for all health care personnel. Clearly the first task was to develop a system of job analyses applicable to all system wide health care manpower tasks. A means of postulating simplified occupational clusters covering some 50 currently designated Navy enlisted occupations, 20 Naval Enlisted Classification Codes (NEC's) were computerized. A set of 16 groupings that cover all designated occupations was developed so as to enhance the effectiveness of professionals and sub-professionals alike. (Author)

AD-A085 676/5 MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Volume II.
Final rept.
31 Aug 74, 539p
Contract N00014-69-C-0246
See also Appendix 1, AD-A085 677.
Availability: Microfiche copies only.

For abstract see AD-A085 675.

AD-A085 677/3 PC **A08**/MF **A01**
Technomics Inc Oakton VA

A System Approach to Navy Medical Education and Training. Appendix 1. Navy Occupational Data Analysis Language. NODAL System User's Manual.
Final rept.
31 Aug 74, 152p
Contract N00014-69-C-0246
Appendix 1 to AD-A085 675 and AD-A085 676. See also Appendix 2, AD-A085 678.

For abstract see AD-A085 675.

AD-A085 678/1 PC **A05**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 2. Task Inventory Booklet (Form N21-Physicians).
Final rept.
31 Aug 74, 84p
Contract N00014-69-C-0246
Appendix 2 to AD-A085 675 and AD-A085 676. See also Appendix 3, AD-A085 679.

For abstract see AD-A085 675.

AD-A085 679/9 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 3. Task Inventory Booklet (Form N22-Dentists).
Final rept.
31 Aug 74, 58p
Contract N00014-69-C-0246
Appendix 3 to AD-A085 675 and AD-A085 676. See also Appendix 4, AD-A085 680.

For abstract for AD-A085 675.

AD-A085 680/7 PC **A05**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 4. Task Inventory Booklet (Form N20-Nurses).
Final rept.
31 Aug 74, 81p
Contract N00014-69-C-0246
Appendix 4 to AD-A085 675 and AD-A085 676. See also Appendix 5, AD-A085 681.

The study objective consisted of a determination of what the health care personnel in the Navy's Medical Department, Bureau of Medicine and Surgery actually do in their occupations; improving the personnel process (education and training); and building a viable career pathway for all health care personnel. Clearly the first task was to develop a system of job analyses applicable to all system wide health care manpower tasks. A means of postulating simplified occupational clusters covering some 50 currently designated Navy enlisted occupations, 20 Naval Enlisted Classification Codes (NEC's) were computerized. A set of 16 groupings that cover all designated occupations was developed so as to enhance the effectiveness of professionals and sub-professionals alike. (Author)

AD-A085 681/5 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 5. Neuropsychiatric Technician.
Final rept.
31 Aug 74, 69p
Contract N00014-69-C-0246
Appendix 5 to AD-A085 675 and AD-A085 676. See also Appendix 6, AD-A085 682.

The study objective consisted of a determination of what the health care personnel in the Navy's Medical Department, Bureau of Medicine and Surgery actually do in their occupations; improving the personnel process (education and training); and building a viable career pathway for all health care personnel. Clearly the first task was to develop a system of job analyses applicable to all system wide health care manpower tasks. A means of postulating simplified occupational clusters covering some 50 currently designated Navy enlisted occupations, 20 Naval Enlisted Classification Codes (NEC's) were computerized. A set of 16 groupings that cover all designated occupations was developed so as to enhance the effectiveness of professionals and sub-professionals alike. (Author)

AD-A085 682/3 PC **A03**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 6. Pharmacy Technician.
Final rept.
31 Aug 74, 45p
Contract N00014-69-C-0246
Appendix 6 to AD-A085 675 and AD-A085 676. See also Appendix 7, AD-A085 683.

For abstract see AD-A085 675.

AD-A085 683/1 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 7. Administrative Practices.
Final rept.
31 Aug 74, 53p
Contract N00014-69-C-0246
Appendix 7 to AD-A085 675 and AD-A085 676. See also Appendix 8, AD-A085 684.

For abstract see AD-A085 675.

AD-A085 684/9 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 8 Occupational/Physical Therapy Technician.
Final rept.
31 Aug 74, 52p
Contract N00014-69-C-0246
Appendix 8 to AD-A085 675 and AD-A085 676. See also Appendix 9, AD-A085 685.

For abstract see AD-A085 675.

AD-A085 685/6 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 9. Laboratory Technician.
Final rept.
31 Aug 74, 61p
Contract N00014-69-C-0246
Appendix 9 to AD-A085 675 and AD-A085 676. See also Appendix 10, AD-A085 686.

For abstract see AD-A085 675.

AD-A085 686/4 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 10. Operating Room Technician.
Final rept.
31 Aug 74, 75p
Contract N00014-69-C-0246
Appendix 10 to AD-A085 675 and AD-A085 676. See also Appendix 11, AD-A085 687.

For abstract see AD-A085 675.

AD-A085 687/2 PC **A05**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 11. Advanced General Duty Corpsman.
Final rept.
31 Aug 74, 79p
Contract N00014-69-C-0246
Appendix 11 to AD-A085 675 and AD-A085 676. See also Appendix 12, AD-A085 688.

For abstract see AD-A085 675.

AD-A085 688/0 PC **A05**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 12. General Duty Corpsman.
Final rept.
31 Aug 74, 90p
Contract N00014-69-C-0246
Appendix 12 to AD-A085 675 and AD-A085 676. See also Appendix 13, AD-A085 689.

For abstract see AD-A085 675.

AD-A085 689/8 PC **A05**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 13. Dental Technician.
Final rept.
31 Aug 74, 79p
Contract N00014-69-C-0246
Appendix 13 to AD-A085 675 and AD-A085 676. See also Appendix 14, AD-A085 690.

For abstract see AD-A085 675.

AD-A085 690/6 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 14. Field Medical Technician.
Final rept.
31 Aug 74, 75p
Contract N00014-69-C-0246
Appendix 14 to AD-A085 675 and AD-A085 676. See also Appendix 15, AD-A085 691.

For abstract see AD-A085 675.

AD-A085 691/4 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 15. Biotronics Technicians.
Final rept.
31 Aug 74, 59p
Contract N00014-69-C-0246
Appendix 15 to AD-A085 675 and AD-A085 676. See also Appendix 16, AD-A085 692.

For abstract see AD-A085 675.

AD-A085 692/2 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 16. Aviation Technician.
Final rept.
31 Aug 74, 73p
Contract N00014-69-C-0246
Appendix 16 to AD-A085 675 and AD-A085 676. See also Appendix 17, AD-A085 693.

For abstract see AD-A085 675.

AD-A085 693/0 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 17. Preventive Medicine Technician.
Final rept.
31 Aug 74, 64p
Contract N00014-69-C-0246
Appendix 17 to AD-A085 675 and AD-A085 676. See also Appendix 18, AD-A085 694.

For abstract see AD-A085 675.

AD-A085 694/8 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 18. Radiation Technician.
Final rept.
31 Aug 74, 55p
Contract N00014-69-C-0246
Appendix 18 to AD-A085 675 and AD-A085 676. See also Appendix 19, AD-A085 695.

For abstract see AD-A085 675.

AD-A085 695/5 MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 19. Dermatology Technician.
Final rept.
31 Aug 74, 41p
Contract N00014-69-C-0246
Appendix 19 to AD-A085 675 and AD-A085 676. See also Appendix 20, AD-A085 696.
Availability: Microfiche copies only.

For abstract see AD-A085 675.

AD-A085 696/3 MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 20. Ophthalmology Technician.
Final rept.
31 Aug 74, 48p
Contract N00014-69-C-0246

Appendix 20 to AD-A085 675 and AD-A085 676. See also Appendix 21, AD-A085 697.
Availability: Microfiche copies only.

For abstract see AD-A085 675.

AD-A085 697/1 MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 21. Orthopedic Technician.
Final rept.
31 Aug 74, 49p
Contract N00014-69-C-0246
Appendix 21 to AD-A085 675 and AD-A085 676. See also Appendix 22, AD-A085 698.
Availability: Microfiche copies only.

For abstract see AD-A085 675.

AD-A085 698/9 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 22. Otolaryngology Technician.
Final rept.
31 Aug 74, 54p
Contract N00014-69-C-0246
Appendix 22 to AD-A085 675 and AD-A085 676. See also Appendix 23, AD-A085 699.

For abstract see AD-A085 675.

AD-A085 699/7 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 23. Urology Technician.
Final rept.
31 Aug 74, 53p
Contract N00014-69-C-0246
Appendix 23 to AD-A085 675 and AD-A085 676. See also Appendix 24, AD-A085 700.

For abstract see AD-A085 675.

AD-A085 700/3 PC **A04**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 24. Equipment Repair Technician.
Final rept.
31 Aug 74, 54p
Contract N00014-69-C-0246
Appendix 24 to AD-A085 675 and AD-A085 676. See also Appendix 25, AD-A085 701.

For abstract see AD-A085 675.

AD-A085 701/1 PC **A05**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 25. Competency Curricula for Clinical Laboratory Assistant and Medical Laboratory Technician.
Final rept.
31 Aug 74, 87p
Contract N00014-69-C-0246
Appendix 25 to AD-A085 675 and AD-A085 676. See also Appendix 26, AD-A085 702.

For abstract see AD-A085 675.

AD-A085 702/9 PC **A05**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 26. Competency Curriculum for X-Ray Technician.
Final rept.
31 Aug 74, 89p
Contract N00014-69-C-0246
Appendix 26 to AD-A085 675 and AD-A085 676. See also Appendix 27, AD-A085 703.

For abstract see AD-A085 675.

AD-A085 703/7 PC **A05**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 27. Competency Curriculum for Nuclear Medicine Technician.
Final rept.
31 Aug 74, 96p
Contract N00014-69-C-0246
Appendix 27 to AD-A085 675 and AD-A085 676. See also Appendix 28, AD-A085 704.

For abstract see AD-A085 675.

AD-A085 704/5 PC **A07**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 28. Competency Curricula for Cardiopulmonary Assistant and Cardiopulmonary Technician.
Final rept.
31 Aug 74, 131p
Contract N00014-69-C-0246
Appendix 28 to AD-A085 675 and AD-A085 676. See also Appendix 29, AD-A085 705.

For abstract see AD-A085 675.

AD-A085 705/2 PC **A07**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 29. Competency Curriculum for Advanced General Duty Corpsman.
Final rept.
31 Aug 74, 141p
Contract N00014-69-C-0246
Appendix 29 to AD-A085 675 and AD-A085 676. See also Appendix 30, AD-A085 706.

For abstract see AD-A085 675.

AD-A085 706/0 PC **A99**/MF **A01**
Technomics Inc Oakton VA
A System Approach to Navy Medical Education and Training. Appendix 30. Curriculum for General Hospital Corpsman.
Final rept.
31 Aug 74, 620p
Contract N00014-69-C-0246
Appendix 30 to AD-A085 675 and AD-A085 676. See also Appendix 1, AD-A085 677.

For abstract see AD-A085 675.

AD-A085 735/9 MF **A01**
Human Resources Research Organization Alexandria VA
Review of the CONARC Systems Engineering of Training Program and Its Implementation of the United States Army Aviation School.
Consultng rept.,
Darwin S. Ricketson, Russel E. Schulz, and Robert H. Wright. Apr 70, 112p
Contract DAHC19-70-C-0012
Availability: Microfiche copies only.

This report reviews a pioneering effort to use modern training technology in designing and implementing training courses for a large-scale system. Information on the systems engineering of Army Aviation training and on the CONARC regulation it was designed to comply with is provided. Conclusions and recommendations for improving the effectiveness of the systems engineering of training are presented. (Author)

AD-A085 748/2 PC **A06**/MF **A01**
Human Resources Research Organization Alexandria VA
An Analysis of Completion Times at Various Army Training Centers of Programmed Instruction Materials for MOS 71 B 10, MOS 71 H 20, & MOS 71 B 20/30.
Consulting rept.,
T. O. Jacobs. Jun 72, 122p Rept no. HUMRRO-CR-D4-72-4
Contract DAHC19-70-C-0012

This report describes a project to determine the extent of differences in course material completion time at Army Training Centers, and to identify ways to predict course completion times. Analyses of variance were run on both predictor and dependent variables, and results are presented here. Appendices contain tables that display data on: (1) correlations among predictor variables, and between predictor variables and dependent variables; ad (2) regression coefficients and multiple correlations between predictors and dependent variables. (Author)

ED-175 444 Not available NTIS
The Use of Satellite Technology in Education: An Evaluation Perspective,
Jody Fitzpatrick. Apr 79, 31p
Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA. April 1979.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

This discussion of research and evaluation issues in the application of satellite communications to education highlights the potential uses of this technology for the educator and points out what educational researchers and administrators can learn from past endeavors. The major projects known collectively as the Health/Education Telecommunications Experiments (HET)--conducted as a joint venture of NASA and HEW--are reviewed, including the Alaska education and health demonstrations, the Appalachian Educational Satellite Project (AESP), the Rocky Mountain Educational Project Satellite Technology Demonstration (STD), the Veteran's Administration experiments, and the Washington-Alaska-Montana-Idaho (WAMI) experiments. The SITE experiment in India is briefly discussed as an example of satellite communications in another country. Conclusions from ATS-6/HET experiments are related to future uses of telecommunications and criteria for evaluating satellite technology in education are offered.

ED-175 454 Not available NTIS
New Jersey State Library, Trenton. Library Development Bureau.
Guidelines for Inclusion of Mediated (Audio-Visual) Instructional Materials in the Resource and Diagnostic Systems at the University of New Hampshire,
David G. Kleinbaum. Jul 78, 144p
Contract NSF-SED76-12191-A01
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

This report identifies special characteristics of AV materials and special considerations for their use, provides a brief overview of general recommendations for the incorporation of statistical AV materials into the resource system, diagnostic system, and summer sessions at the University of New Hampshire, and gives detailed procedures for carrying out the general recommendations. Guidelines are also provided for updating a media survey conducted by the American Statistical Association which has resulted in two lists--a 1974-75 compilation of audiovisual materials offered for sale as reported by publishing companies, and a 1975 compilation of predominately unpublished materials developed by statistics instructors and/or instructional designers for local use. Included in the text are a survey report form, a resource classification form, a checklist for initial inclusion in the system, an evaluation form for appraising the content of materials, an attitude questionnaire, and a brochure for a proposed workshop on uses of media in teaching statistics. Appendices include the two ASA lists, appraisals of selected media, and referenced survey and appraisal forms.

ED-176 723 Not available NTIS
System of Training Library Workers and Improvement of Their Professional Skill in the U.S.S.R. Reaction paper by Charles D. Churchwell,
K. I. Abramov. May 79, 57p
Papers presented at the Soviet-American Library Seminar (1st), Washington, DC., May 4-6, 1979. For related documents, see IR 007 541-547. Text in Russian and English.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

The organization and development of the library education system in the USSR is described by K. I. Abramov of the Moscow State Institute of Culture and is summarized in a comment paper by Charles D. Churchwell, Washington university. Abramov begins by stating the philosophical basis for the existence of libraries and librarians in the USSR, and describes the indispensable roles they are expected to play in the development of a socialist society. A description of the library education system notes persons who have played prominent roles in the development of the theory and practice of librarianship in Russia, but focuses on the specific parts of the library education network. Programs and courses, and their organization, are detailed. Changes taking place in library education in Russia are reviewed and a statement of plans for contin-

ued growth and improvement of both libraries and library education is provided. Churchwell makes some comparisons between library education in the United States and the USSR. He also amplifies Abramov's presentation, raises questions regarding the system of library education, and notes possible improvements for the future.

ED-176 724 Not available NTIS
Wisconsin State Dept. of Public Instruction, Madison.
Standards for Instructional Media Programs, 1977-1982.
1977, 20p WSDPI-Bull-9174
For related document, see ED-101 673.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

Intended to provide individual school district and building level instructional media personnel and school administrators with information for decision-making, these standards are concerned with the scope, direction, and financial support of instructional media programs. Component parts of a good instructional media program at the district and building level are identified, and specific directions for Wisconsin schools are detailed. Appendices include the objectives of the Bureau of School Library Media Programs, a table of Cooperative Educational Service Agencies (CESA) media services available, and a list of Regional Broadcast Instruction Councils in Wisconsin.

ED-176 801 Not available NTIS
Educational Technology Publications, Englewood Cliffs, NJ.
Computer-Assisted Instruction Using BASIC,
John F. Huntington. 1979, 240p
Available from Educational Technology Publications, Englewood Cliffs, NJ. 07632 ($14.95). Document Not Available from EDRS.

This book providing direction for the planning, designing, and writing of programs for computer assisted instruction (CAI) includes chapters on the role of computers in instruction, the BASIC programming language, flowcharting, terminal commands, displaying instruction, dialogues, learning theories, the process of instruction, and the planning of instruction. Each chapter contains an annotated bibliography of reference readings. The appendix provides descriptions with examples of the EDPOL, NUME, STD-RESULTL, NS, and PEOPLE programs, which can be implemented as task management procedures in a CAI/CMI system.

HRP-0901425/9 PC **A14**/MF **A01**
California Univ., San Francisco. Program for Women in Health Sciences.
Women's Leadership and Authority in the Health Professions. Proceedings of Conference, Held at University of California, Santa Cruz on June 19-21, 1977,
Lucy Ann Geiselman, Patricia Bourne, and Sheryl Ruzek. 4 Aug 77, 306p
Contract PHS-HRA-230-76-0269

The proceedings of a 1977 conference on women's leadership and authority in the health professions are presented. The conference was sponsored by the Program for Women in Health Sciences at University of California, San Francisco, and was attended by representatives of educational institutions, research organizations, and national educational associations. The conference agenda, opening remarks, and keynote address are included. The conference objective was to examine career development issues for women who are already in leadership positions in the health sciences. Working sessions were conducted to explore the informal organization of leadership and authority, barriers to advancement, the roles of choice and channeling in career patterns, structures of leadership and authority, innovative training programs, and directions for change. Papers were presented on feminist networks in the health sciences, role models, counseling victims of sex discrimination, case studies of sex discrimination complaints, women in medicine, continuity in the careers of young female physicians, a typology of achievement patterns, women in decisionmaking, women in participatory democracy, and a number of other topics. Also included are abstracts of additional papers.

HRP-0902202/1 PC **A02**/MF **A01**
National Center for Health Education, San Francisco, CA.
Role Delineation Project for Health Education. Executive Summary.
Final rept. 26 Sep 78-31 Jan 80, 1979, 8p
Contract PHS-232-78-0154
See also HRP-0902068.

The Role Delineation Project for Health Education was undertaken to delineate the actual and appropriate roles and functions of entry-level health educators. A comprehensive description of their major and specific functional responsibilities and requisite skills and knowledge for quality practice was developed. This description was to be an appropriate base for academic preparation of health educators, and prepared in a form amenable to subsequent development of criterion-referenced proficiency examinations.

PB80-193428 PC **A08**/MF **A01**
Bureau of Social Science Research, Inc., Washington, DC.
Assessment of a WIN Quality Training Demonstration Project. Phase I Report: Characteristics of Participants.
Interim rept.,
Richard N. White. Apr 80, 162p BSSR-0595-1, DLETA-51-11-78-03-1
Grant DL-51-11-78-03

The document presents a baseline description of the 270 women taking part in the assessment of a highly innovative demonstration program to train female WIN participants to become skilled electronics technicians eligible for high-paying jobs in private industry. Information is presented on the personal and family characteristics of the women in the study, and on their job, training and welfare histories. Some preliminary information on the experiences of the women in the training, labor force activities of the comparison group (137 of the study participants, found to be interested and qualified for this training but not chosen in a random selection process) and observations on the functioning of the program by school, WIN and BSSR staff are also presented.

PB80-194681 PC **A05**/MF **A01**
Manpower Demonstration Research Corp., New York.
Preliminary Research Findings: WIN (Work Incentive) Research Laboratory Project.
Preliminary rept.,
Barbara Goldman. Apr 80, 94p DLETA-51-36-77-03-02
Grant DL-51-36-77-03

The WIN Research Laboratory Project began in 1977 as a means of testing innovative approaches to the delivery of services in WIN. The project consists of 4 sites: Denver, Louisville, Madison, and Racine. This report is a brief description of the service delivery models and of the results of the research from the first 4 months of the operation of those models.

PB80-194947 PC **A03**/MF **A01**
Office of Personnel Management, Washington, DC. Supervisory and Communications Training Center.
Courtesy in Government, Trainer's Manual.
Apr 80, 50p WDS-25HA-4-80

Courtesy in Government is essentially a communications workshop. It explores those aspects of oral and interpersonal communications that are needed by Government employees as they meet the public in person-to-person contacts and by telephone. The workshop, though short, is characterized by a singleness of purpose. Day 1 is devoted to theory; Day 2 to practice. The uniqueness of this workshop lies in the fact that the course objectives of Day 1 become the criteria for evaluating the role plays of Day 2. And these same criteria are recommended at the end of the workshop as a follow-up evaluation to be used from time to time back at the office so that the public may evaluate the service it is receiving.

5J. Psychology (Individual and Group Behavior)

AD-A085 549/4 PC **A02**/MF **A01**
School of Aerospace Medicine Brooks AFB TX
Values Clarification and the Post-Myocardial Infarction Patient,
Mary J. Rheinscheld. 1980, 5p Rept no. SAM-TR-79-273
Pub. in Aviation Space and Environmental Medicine, v51 n5 p521-523 May 80.

No abstract available.

AD-A085 737/5 PC **A03**/MF **A01**
Human Resources Research Organization Alexandria VA
A Pilot Study of Experimenter-Subject Effect on Dark Adaptation Thresholds.
Staff paper,
Donald L. Wright. Oct 69, 30p
Contract DAHC19-70-C-0012

To extend the findings of studies of experimenter-induced effect on research data to the area of sensory research, in which the experimenter often serves as his own subject (ES), a pilot study was designed to permit the operation of ES-induced bias during the collection of foveal dark adaptation data. An attempt was made to instil an expectancy in the ES before data collection, by acquainting him with the often-reported finding of a positive relationship between preadaptation duration (PD) and threshold elevation (TE) in dark adaptation. During the experiment, PD was frequently misrepresented as being longer or shorter than the actual PD. The data provided some support for the notion that expectancy of a positive relationship between PD and TE (apart from PD per se) may determine the elevation of the visual threshold in dark adaptation. But more of the data supported the post hoc notion that expectancy of a curvilinear relationship between PD and TE determined TE in this experiment. Reasons for inferring that this expectancy of a curvilinear relationship originated during data collection are discussed. (Author)

AD-A085 769/8 PC **A05**/MF **A01**
Minnesota Univ Minneapolis Dept of Psychology
Interactive Computer Administration of a Spatial Reasoning Test.
Research rept.,
Austin T. Church, and David J. Weiss. Apr 80, 82p Rept no. RR-80-2
Contract N00014-76-C-0243

This report describes a pilot study on the development and administration of a test using a spatial reasoning problem, the 15-puzzle. The test utilized the on-line capabilities of a real-time computer (1) to record an examinee's progress on each problem through a sequence of problem-solving 'moves' and (2) to collect additional on-line data that might be of relevance to the evaluation of examinee performance (e.g., number of illegal and repeated moves, response latency trends). The examinees, 61 students in an introductory psychology class, were required to type a sequence of moves that would bring one 4 x 4 array of scrambled numbers (start configuration) into agreement with a second 4 x 4 array (goal configuration), using as few moves as possible. Data analyses emphasized the comparison of several methods of indexing problem difficulty, methods of scoring individual performance, and the relationship between response latency data, performance, and problem-solving strategy. Subjective ratings of the perceived difficulty of replications of the 15-puzzle were obtained from a separate student sample to investigate (1) the subjective dimensions used by students in evaluating the difficulty of this problem type, (2) how accurately the actual performance difficulty of these problems could be evaluated by students, and (3) whether there were reliable individual differences in difficulty perceptions related to actual performance differences.

ED-175 440 Not available NTIS
Advanced Research Projects Agency, Arlington, VA.
Promoting Self-Discovery of Improved Strategies,
Robert Neches. 24 Mar 78, 46p
Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA., April 8-12, 1979.

Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

This paper describes an approach to task analysis which seeks to identify potential sources of difficulty in the self-discovery of improved procedures by students who have been taught simpler procedures. The approach considers novices' procedures in terms of the changes needed to produce an expert procedure; the knowledge required to make those changes, and the processing demands of acquiring that knowledge, can then be determind. An analysis of strategy improvement in a relatively simple domain--single digit arithmetic--is provided as an example.

PB80-195035 PC **A23**/MF **A01**
Wisconsin Univ.-Madison. Graduate School of Business Administration.
Task Design, Monetary Outcomes, and Worker Responses.
Final rept. Mar 79-Jun 80,
Kimberly Bryan Boal. Mar 79, 540p M-721,
DLETA-91-55-79-16-1
Grant DL-91-55-79-16

Two field experiments were conducted. The first sought to test the hypothesis that extrinsic rewards would reduce intrinsic motivation. Support was found for this hypothesis on complex tasks but not simple tasks. However, the theoretical framework utilized could not explain these results. The second field experiment sought to examine the effects of changes in task design and monetary outcomes, as well as the individual's growth need strength on the worker's responses. Changes in task design and monetary outcomes were found to have main effects as well as interacting with each other and the individual's growth need strength to influence the worker's responses, both attitudinally and behaviorally.

PB80-195688 PC **A10**/MF **A01**
Southwest Educational Development Lab., Austin, TX.
The Structure of Withdrawal: Relationships Among Estrangement, Tardiness, Absenteeism and Turnover.
Final rept.,
Nina Gupta, and G. Douglas Jenkins, Jr. May 80,
222p DLETA-91-48-78-39-1
Grant DL-91-48-78-39
Prepared in cooperation with Texas Univ. at Austin.

The study consists of theoretical and empirical explorations of the structure of withdrawal. Objectives of the research included determining whether four forms of withdrawal (estrangement, tardiness, absenteeism, turnover) were related to one another, and determining the precise form of these relationships. Specifically, it was argued that withdrawal manifestations progress from their least to most severe forms. Data from approximately 200 employees in each of three organizations (a pet-food manufacturer, a bank, and a public transportation authority) were examined.

PB80-195944 PC **A03**/MF **A01**
Maryland Univ., College Park. Dept. of Fire Protection Engineering.
An Examination and Analysis of the Dynamics of the Human Behavior in the Fire Incidents at the Sheppard and Enoch Pratt Hospital on October 25 and 26, 1978.
Final rept.,
John L. Bryan, and Philip J. DiNenno. 31 Jan 79,
36p NBS-GCR-80-227
Contract NBS-7-9014

Two fire incidents occurred in this hospital facility on October 25 and 26, 1978. Both fires involved the suspected incendiary ignition of office papers and records on the desk top and the top of file cabinets in Room 327 of 'B' Building. Both fire incidents were detected by administrative staff personnel as an odor of smoke. The telephone operator of the facility was notified and the facility 'Fire Call' announcement was initiated over the public address system with the location of smoke odor. The facility fire brigade extinguished the fire on October 25 and the fire department was not notified. A safety officer extinguished the fire on October 26, and the fire department was notified at the request of the safety officer. It responded and verified extinguishment. Both fires were extinguished with six pound all purpose dry chemical extinguishers. Patient areas were not involved in either fire incident; no personnel were evacuated. The four-story fire resistive building was approximately 80 years old.

PB80-196025 PC **A03**/MF **A01**
Maryland Univ., College Park. Fire Protection Curriculum.
An Examination and Analysis of the Dynamics of the Human Behavior in the Fire Incident at the Washington Adventist Hospital on December 9, 1978.
Final rept.,
John L. Bryan, and Philip J. DiNenno. 31 Mar 79,
29p NBS-GCR-80-229
Contract NBS-7-9014

The fire incident at the Washington Adventist Hospital on December 9, 1978 was initially detected by a nurse's aide in nursing unit 3200 as an odor of smoke in the corridor near the elevator. The nurse's aide immediately activated the facility local alarm system at approximately 1047 hours. In accordance with the facility emergency procedures the hospital operator initiated the verbal 'Doctor Red' announcement on the public address system and notified the Department of Fire and Rescue Services Communication Center on the direct private phone line. The nursing staff in the facility placed patients in their rooms and closed the patient room doors. The hospital security staff and the Takoma Park Volunteer Fire Department responded to nursing unit 3200 which is located on the third floor of the 5-story and 2 basement fire resistive building. When the source of the smoke odor was not identified on the third floor, an investigative search of the lower floors was initiated. A light haze of smoke was detected outside the ladies locker room, room LL2 on the subbasement level, and a developing fire involving three lockers within the room. The fire department personnel immediately extinguished the fire with one 1-1/2 inch hose line supplied from the building wet standpipe system. Due to the fire resistive construction of the building, the location of the fire, and its immediate suppression, the need for patient evacuation was precluded.

PB80-197254 PC **A03**/MF **A01**
Maryland Univ., College Park. Fire Protection Curriculum.
An Examination and Analysis of the Dynamics of the Human Behavior in the Fire Incident at the North Arundel Hospital on September 4, 1978.
Final rept.,
John L. Bryan, and Philip J. DiNenno. 31 Oct 78,
29p NBS-GCR-80-224
Grant NBS-7-9014

The fire incident at the North Arundel Hospital on September 4, 1978 was detected by a nurse at approximately 1315 hours. The fire at detection consisted of a smoldering propagation with a char area approximately two inches in diameter on the bedspread and blankets covering a sleeping, sedated patient. The building in which the fire zone was located was of fire resistive construction, approximately four years old. At the time of the fire incident the building had a registered occupancy of approximately 285 patients. No patients were evacuated or moved in this fire incident. The bedding materials involved were removed from the bed and patient, carried to a utility room and extinguished by dousing with water in a sink. The staff and fire department were not notified, no visible smoke spread occurred, and there were no staff or patient injuries.

PB80-197262 PC **A03**/MF **A01**
Maryland Univ., College Park. Fire Protection Curriculum.
An Examination and Analysis of the Dynamics of the Human Behavior in the Fire Incident at the St. Annes Infant Home on June 20, 1978.
Final rept.,
John L. Bryan, and Philip J. DiNenno. 30 Sep 78,
26p NBS-GCR-80-221
Grant NBS-7-9014

The fire incident at the St. Annes Infant Home on June 20, 1978, was detected by the administrator at approximately 2015 hours. The fire at detection involved the overheating of electrical switch gear, which produced a white-colored smoke, completely filling the boiler room in the basement. The four-story and basement building of fire resistive construction was erected approximately 15 years ago. At the time of the fire incident, the facility had an occupancy of 79 children and 15 mothers. The fire was confined to the overheated electrical switch gear, with no visible flames, and smoke limited to the boiler room, the area of fire origin. The fire department was notified and responded. No residents were moved within the facility or evacuated from the facility. The staff action of turning off the electrical power stopped the overheating, and of closing the boiler room door confined the smoke.

PB80-199235 PC **A03**/MF **A01**
Maryland Univ., College Park. Dept. of Fire Protection Engineering.
An Examination and Analysis of the Dynamics of the Human Behavior in the Fire Incident at the Spring Grove Hospital Center on December 14, 1978.
Final rept.,
John L. Bryan, and Philip J. DiNenno. 31 Jan 79,
30p NBS-GCR-80-230
Grant NBS-7-9014

A secretary on Ward A of the White Building at the Spring Grove Hospital Center on December 14, 1978 at approximately 1205 hours detected an odor of smoke. The odor was localized in the corridor in the South West portion of the building. The secretary notified the telephone operator, who sent maintenance personnel to the building to locate the source of the smoke odor. Since smoke odor persisted the secretary called the safety officer. The safety officer immediately notified the telephone operator who initiated the facility emergency procedures and notified the fire department. The White Building was evacuated of approximately 120 patients and 12 nursing staff. The safety officer located the source of the smoke odor from a fluorescent light ballast in an office. The Baltimore County Fire Department arrived, verified extinguishment and removed residues of the smoke. The one-story, fire resistive building was approximately twenty years old. This is one building at this residential regional mental hospital center consisting of twenty-two buildings with a total capacity of 1,484 patients.

5K. Sociology

AD-A085 668/2 MF **A01**
Messer Associates Inc Rockville MD
Study to Develop Unified Investigative Capability and Policy Among the CVS, MEP, PSS, and RBS Programs.
Final rept. Oct 78-Dec 79,
Robert A. Camozzo, John C. Lyons, H. Donald Messer, James C. Thomas, and Heath E. Warren. Dec 79, 176p USCG-M-4-80
Contract DOT-CG-74059-A
Availability: Microfiche copies only.

Four Coast Guard investigation programs (Commercial Vessel Safety, Marine Environmental Protection, Port Safety and Security, and Recreational Boating Safety) are studied to ascertain current program organizations and operations, and to recommend methods to enhance and unify Coast Guard investigative posture. Extensive interviewing and data collection were done, both in the field and at Coast Guard Headquarters. Data on personnel, training and caseloads were compiled and are analyzed for comparative performance levels. This information, in addition to that acquired relevant to information flow and investigate hierarchies, provides documentation of current investigative procedures and is the basis upon which recommendations for achieving a more unified and efficient investigative system are made. Major recommendations deal with field unit organization, officer assignment and training, use of enlisted personnel, recreational boating accident investigation, review of investigative reports, and data processing activities and equipment. Other recommendations are made on implementation of the Marine Safety Office (MSO) concept, Headquarters' organization, investigating and reporting minor incidents, consolidation of field offices with low investigative activity, and standardization of penalties. A

summation of the recommendations and an overview of the resulting unified organization, manpower utilization, and data flow is given. (Author)

AD-A085 744/1 PC **A06**/MF **A01**
Urban Inst for Human Services Inc San Francisco CA
Behavioral Criteria in Research and the Study of Racism: Performing the Jackal Function. Part I.
Technical rept. no. 1, 15 Mar 78-1 Jan 79,
Asa G. Hilliard, Yolanda L. Jenkins, and Mona C. Scott. Jan 79, 109p
Contract N00014-77-C-0183
See also Part 2, AD-A080 032.

This is a literature review and theory paper which takes a holistic approach to the problem of the measurement of behavioral change, particularly changes in racist behavior. A general conceptual model of behavior in 'ecological' perspectives is presented. This is followed by a presentation of the application of this model to racist behavior based upon a theory of racist behavior. The sources of behaviors which can serve as criteria are described. A demonstration of the application of the use of the theoretical model of behavior to sort random behaviors of the categories is presented. Finally, the use of the classification of sorted behaviors as the basis for the development of observation instruments is shown. (Author)

AD-A085 771/4 PC **A05**/MF **A01**
RAND Corp Santa Monica CA
The Cross and Laporte Kidnappings, Montreal, October 1970.
Interim rept.,
Eleanor S. Wainstein. Feb 77, 76p Rept no. RAND/R-1986/1-DOS/ARPA
Contract DAHC15-73-C-0181, ARPA Order-189-1

Analyzes events surrounding the kidnapping of British Trade Commissioner James R. Cross and Quebec Labor Minister Pierre Laporte by members of the militant French Canadian Quebec Liberation Front (FLQ). Laporte was murdered; the Canadian government was eventually able to negotiate Cross release unharmed, but only after invoking the War Measures Act. The report is one of a series of case studies of international incidents involving diplomatic kidnapping and hostage negotiations. Policy implications of government actions, conduct and treatment of the hostages, and details of the release negotiations are emphasized. (Author)

ED-176 713 Not available NTIS
Projection of National Values into Films and Television Programs,
M. F. Malik. 1977, 13p
For related documents, see IR 005 024 and IR 005 029.
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA. 22210.

The potential impact of cultural factors on how an audience perceives the content of a film or television program is briefly reviewed as background for this description of courses on 'national values' offered in Montreal for film and television-makers. Information patterns identified and labeled as 'national values' include (1) historical-hereditary group, where the same or similar expression of events, thoughts, attitudes are shared by a group of people across a certain time, generation, or tribe; (2) ethnographical group, where the similarity of expression is cued to a certain geographical region inhabited by one or several cultures; (3) ethnopolitical group, where the similarity of problems is cued to a certain social or political structure, regime, or tradition; and (4) ethnocultural group, where the expression of craftsmen and artists is mainly created and shared by a certain group of inhabitants. Emotional and rational impacts are discussed in reference to the perception of films and television programs with strong national, cultural emphases. Communication analysis, research, and programming are considered as possible tools for young artists to find out if there is a correspondence between their ideas and the way in which audiences perceive them.

PB80-190879 PC **A03**/MF **A01**
Department of Housing and Urban Development, Washingon, DC. Div. of Policy Studies.
Research Design for HUD Study of Rental Conversions to Condominiums and Cooperatives.
24 Oct 79, 29p HUD-0001214

The proposal presents a plan and schedule for a study of condominium and cooperative conversions, accumulating systematic national data to measure the extent, location, causes, and effects of this activity. Research objectives include estimating the number of conversions which have occurred nationally since 1970, identifying them geographically, and projecting conversion estimates for 1980 to 1985. In addition, the factors contributing to the increase of conversions are assessed, as well as the impacts that the process may have on households to be affected (especially low-income and elderly), the housing market, neighborhoods, and Federal and local tax revenues.

PB80-192974 PC **A09**/MF **A01**
ESCA-Tech Corp., Costa Mesa, CA.
Archaeological and Historical Survey Kesterson Reservoir.
Final rept.
11 Jan 80, 198p
Sponsored in part by Water and Power Resources Service, Sacramento, CA.

In December 1979 a Class III Cultural Resource Survey was carried out for the proposed Stage II areas of Kesterson Reservoir, Merced County, California. The project involved an archive search of existing data and an in-the-field examination of 100% of the project area. The field examination phase utilized a mixed survey strategy in that slightly more than half of the area was covered by mule-back while the remaining portion was done on foot. The survey resulted in the discovery of seven (7) possible Late Prehistoric village sites and four (4) temporary camps/activity facies, along the two major sloughs in the project area.

PB80-195225 PC **A02**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. Economic Development Div.
Aspects of Welfare and Poverty in Rural America: Two Issue Briefs.
Staff rept.,
Thomas A. Carlin, Robert A. Hoppe, Linda M. Ghelfi, and Janet W. Coffin. Nov 79, 22p

The report presents two briefs on welfare and poverty issues by Department and White House staff. The papers outline the effects on the rural population of: (1) the Administration's current welfare reform proposal and (2) the farm differential in the poverty threshold.

PB80-812746 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Migrant Workers. 1964-June, 1980 (A Bibliography with Abstracts).
Rept. for 1964-Jun 80,
Edith Kenton. Jul 80, 94p
Supersedes NTIS/PS-79/0664 and NTIS/PS-78/0349.

Needs and problems of the migrant worker are reviewed. Aspects include medical and health care, housing, employment, education needs, and the interaction of the migrant and the community. (This updated bibliography contains 87 citations, 9 of which are new entries to the previous edition.)

6. BIOLOGICAL AND MEDICAL SCIENCES

6A. Biochemistry

AD-A085 420/8 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
An Improved Radiochemical Method for Measuring Ferrochelatase Activity,
Harold L. Williams, Deadre J. Johnson, Michael J. Haut, Sylvester Slater, and Ruth G. Brennan. 4 Sep 79, 6p
Pub. in Clinical Chemistry, v26 n1 p153-156 Jan 80.

No abstract available.

AD-A085 538/7 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Binding of Diphtheria Toxin to Phospholipids in Liposomes,
Carl R. Alving, Barbara H. Iglewski, Katharine A. Urban, Joel Moss, and Roberta L. Richards. 25 Jan 80, 7p
Pub. in Proceedings of the National Academy of Sciences USA. v77 n4 p1986-1990 Apr 80.

No abstract available.

BNL-27287 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Weak Binding Gases as Modulators of Hemoglobin Function.
B. P. Schoenborn, A. Saxena, and B. E. North. 15p
Contract EY-76-C-02-0016

Studies are reported in which the mechanisms of binding of inert gaseous agents to hemoglobin and myoglobin are investigated. Specific binding sites are mapped. Possible effects on sickle cell formation and oxygen binding are discussed. (ERA citation 05:023144)

6B. Bioengineering

PAT-APPL-6-145 273 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
Biocentrifuge System Capable of Exchanging Specimen Cages While in Operational Mode.
Patent Application,
R. R. Belew. Filed 30 Apr 80, 20p N80-24342/1, NASA-CASE-MFS-23825-1
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A bioresearch centrifuge system for subjecting caged animals to long term centrifugal forces that create gravity conditions aboard orbiting spacecraft is disclosed. The biocentrifuge system is comprised of a centrifuge carrying a plurality of removable and replaceable cages for the animal specimens. Pairs of opposing cages may be removed from the frame while it is rotating, by means of a cage exchanger which rotates concentrically within the centrifuge and the speed of which is controlled independently of the frame speed. An image rotator is provided for selective observation of the rotating animals. The system further includes a waste conveyor system, a food supply system, and a water supply system for each cage for creating a life sustaining environment so that the animals can live in the rotating centrifuge for extended periods. The rotating cage exchanger can also be used to selectively remove containers from various other centrifuges or other rotatable frame structures.

6C. Biology

AD-A085 542/9 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Anopheles Barbirostris - Confirmation of Introduction on Island of Guam,
R. A. Ward, and B. Jordan. 1979, 3p
Pub. in Mosquito News, v39 n4 p802-803 Dec 79.

No abstract available.

AD-A085 544/5 PC **A02**/MF **A01**
Naval Medical Research Unit No 3 FPO New York 09527
Observations on the Subgenus Argas(Ixodoidea: Argasidae: ARGAS). 14. Identity and Biological Observations of Argas (A.) cucumerinus from Peruvian Seaside Cliffs and a Summary of the Status of the Subgenus in the Neotropical Faunal Region.
Technical Rept.,
Carleton M. Clifford, Harry Hoogstraal, James E. Keirans, Robin C. A. Rice, and William E. Dale. 1978, 20p Rept nos. NAMRU-3-TR-28/79, NAMRU-3-ACC-1173
Pub. in Jnl. of Medical Entomology, v15 n1 p57-73, 7 Nov 78. See also report dated 17 May 72, AD-784 460.

No abstract available.

AD-A085 599/9 PC **A02/MF A01**
Naval Ocean Systems Center San Diego CA
Plantings of Red Mangroves (Rhizophora Mangle L.) for Stabilization of Marl Shorelines in the Florida Keys.
Final rept. Jul 77-May 79,
H. W. Goforth, Jr., and J. R. Thomas. 1 Feb 80, 22p Rept no. NOSC/TR-506

Shoreline stabilization using mangrove plantings offers an environmentally and economically superior alternative to the construction of seawalls, riprap, etc. Three developmental stages of red mangroves (i.e., propagules, seedlings and small trees) were planted to provide erosion protection along three separate sections of marl shoreline at Key West, Florida. Mangrove propagules ('beans') which were carefully removed from mature fruits or collected from shoreline debris exhibited the greatest vertical growth. However, survival of this stage ranged from 86-14% (X = 45%) and was inversely related to the degree of shoreline exposure. Seedlings (approximately 1 year old) did not exhibit a significantly greater survival rate (X = 48%) or vertical growth than propagules. Transplants of small mangrove trees(i.e., approximately 2-3 years old) were highly successful on all three shorelines exhibiting an average survival of 98% after 23 months. Degree of exposure to erosion and/or burial proved more important in determining seedling survival than either of the organic amendments or tidal heights tested. Using a power auger to bore holes and seagrass wrack as mulch proved to be an effective and economical method of planting all three developmental stages of red mangroves along organically deficient marl shorelines. However, marl shorelines exposed to moderate wave, tidal, or wind action are best planted with small mangrove trees to insure transplant survival and erosion protection. (Author)

COO-2121-63 PC **A02/MF A01**
Illinois State Univ., Normal.
Proof That Univalent Chromosomes Undergoing Equational Division at Anaphase I Are Not Lost During the Second Meiotic Division.
D. F. Weber. 1980, 2p
Contract EY-76-S-02-2121

Monosomics in a diploid organism are ideal for characterizing the behavior of univalent chromosomes because each meiotic cell contains a univalent chromosome. We have isolated microsporocyte samples from all monosomic types except monosomics 3 and 5 and have carried out extensive analyses of the meiotic behavior in each of the different available monosomic types. It is demonstrated that univalent chromosomes can undergo equational division at the first anaphase and the resultant monads are not lost during the remainder of meiosis. (ERA citation 05:023023)

COO-2121-64 PC **A02/MF A01**
Illinois State Univ., Normal.
Visualization of Sister-Chromatid Exchanges in Maize Mitotic Chromosomes Utilizing 5-Bromodeoxyuridine.
T. S. Chou, and D. F. Weber. 1980, 2p
Contract EY-76-S-02-2121

The protocol to visualize sister-1 chromatid exchanges in maize root-tip somatic chromosomes is presented. The technique used was fluorescence plus Giemas. (ERA citation 05:023024)

COO-2121-65 PC **A02/MF A01**
Illinois State Univ., Normal.
Using Compound B-A Translocations in Maize to Segment Chromosomes.
D. F. Weber. 1980, 2p
Contract EY-76-S-02-2121

The use of compound B-A translocations in maize to define the location of mutant factors is discussed. (ERA citation 05:023025)

COO-2121-68 PC **A03/MF A01**
Illinois State Univ., Normal.
Cytogenetics of Monosomes in Zea Mays. Comprehensive Report, February 1, 1977-May 15, 1980.
D. F. Weber. Feb 80, 34p
Contract EY-76-S-02-2121

Progress is reported in research on the cytogenetics of maize. The study has identified genetic factors that control the meiotic process, genetic recombination, lipid biosynthesis, and the free amino acid pool. It has also been determined that distributive pairing, gene compensation, and gene magnification do not occur in maize. (ERA citation 05:023026)

LA-8302-MS PC **A02/MF A01**
Los Alamos Scientific Lab., NM.
Detection of Early Changes in Lung Cell Cytology by Flow-Systems Analysis Techniques.
J. A. Steinkamp, J. S. Wilson, and Z. V. Svitra. Mar 80, 12p
Contract W-7405-ENG-36

Ongoing experiments designed to develop automated flow-analysis methods for assaying damage to pulmonary lavage cells in experimental animals exposed by inhalation to environmental pollutants are summarized. Pulmonary macrophages were characterized on their ability to phagocytize polystyrene latex fluorescent spheres. Lung cells consisting primarily of macrophages and leukocytes were analyzed for fluorescence (phagocytosis of spheres) and size using flow cytometric methods. Studies also concentrated on combining phagocytosis with other cellular parameters (DNA content, cell viability, and B-glucuronidase activity). As baseline studies are completed in normal animals, experimental animals will be exposed to gaseous and particulate environmental pollutants. (ERB. (ERA citation 05:023152)

PAT-APPL-6-039 527 PC **A02/MF A01**
Department of Energy, Washington, DC.
Improved Method and Apparatus for Electrostatically Sorting Biological Cells.
Patent Application,
J. T. Merrill. Filed 16 May 79, 16p
Contract W-7405-ENG-48
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

An improved method of sorting biological cells in a conventional cell sorter apparatus includes generating a fluid jet containing cells to be sorted, measuring the distance between the centers of adjacent droplets in a zone thereof defined at the point where the fluid jet separates into descrete droplets, setting the distance between the center of a droplet in said separation zone and the position along said fluid jet at which the cell is optically sensed for specific characteristics to be an integral multiple of said center-to-center distance, and disabling a charger from electrically charging a specific droplet if a cell is detected by the optical sensor in a position wherein it will be in the neck area between droplets during droplet formation rather than within a predetermined distance from the droplet center. (ERA citation 05:024701)

PB80-193246 PC **A02/MF A01**
Johns Hopkins Univ., Baltimore, MD. Chesapeake Bay Inst.
Herpetological Survey of the Proposed Expansion Site for Vienna Steam Electric Station, Vienna, Dorchester County, Maryland.
Special rept.,
Robert H. Johnson, and Marie Van Deusen. Sep 79, 22p CBI/SR-76, REF-79-7

This report presents the results of a herpetological survey conducted in the vicinity of the Vienna Steam Electric Station, Dorchester County, Maryland. Chicone Creek, which forms the eastern boundary of the site, does offer much habitat for reptiles and amphibians. Of the 24 species of reptiles and 17 species of amphibians reported from Dorchester County, 9 species of reptiles and 8 amphibians were observed during this study.

PB80-194061 PC **A03/MF A01**
National Marine Fisheries Service, Seattle, WA.
Marine Fisheries Review. Volume 41, Number 12, December 1979.
Dec 79, 45p NOAA-80042403
See also Volume 41, Number 11, PB80-183486.

In addition to the regular sections, this issue contains the following articles: Value Added, Margins, and Consumer Expenditures for Edible Fishery Products in the United States, 1976-78; Oyster Seed Hatcheries on the U.S. West Coast: An Overview; A Mechanical Escalator Harvester for Live Oysters and Shell; Development of a Self-Culling Blue Crab Pot; and Composition of Catches Made by Anglers Fishing for Summer Flounder, Paralichthys dentatus, from New Jersey Party-boats in 1978.

PB80-194079
(Order as PB80-194061, PC **A03/MF A01**)
National Marine Fisheries Service, Washington, DC.
Value Added, Margins, and Consumer Expenditures for Edible Fishery Products in the United States, 1976-78,
Erwin S. Penn, and Wenona J. Crews. Dec 79, 10p NOAA-80042403-1
Included in Marine Fisheries Review, v41 n12 p1-9 Dec 79.

The presentation in value terms of the basic estimates in this study makes it possible to produce analogous figures that can be compared with gross national product value of other industries, and total and per capita expenditures for other food products.

PB80-194087
(Order as PB80-194061, PC **A03/MF A01**)
Oregon State Univ., Corvallis. Dept. of Agricultural and Resource Economics.
Oyster Seed Hatcheries on the U.S. West Coast: An Overview,
Jerry E. Clark, and R. Donald Langma. Dec 79, 8p NOAA-80042403-2
Grant NOAA-04-7-158-44085
Included in Marine Fisheries Review, v41 n12 p10-16 Dec 79.

Oyster seed production, which includes the spawning of adults and a relatively short free-swimming larval period, has been an undependable link in the natural reproductive cycle of oysters. An attempt to spawn oysters under controlled conditions and to improve on the chances of survival lead to the establishment of a small number of commercial oyster hatcheries. This paper discusses the role of commercial oyster hatcheries on the U.S. west coast. Oyster hatcheries have been in existence on the west coast since 1967 and, despite early promise, have experienced only limited success. The west coast oyster industry is in a period of transition. What was once an industry of numerous small, family-type operations is now, with respect to production at least, heavily dominated by large family and corporate enterprises.

PB80-194095
(Order as PB80-194061, PC **A03/MF A01**)
Virginia Inst. of Marine Science, Gloucester Point.
A Mechanical Escalator Harvester for Live Oysters and Shell,
D. S. Haven, J. P. Whitcomb, and Q. C. Davis. Dec 79, 5p CONTRIB-877, NOAA-80042403-3
Included in Marine Fisheries Review, v41 n12 p17-20 Dec 79.

A mechanical oyster harvester has been developed by coupling a newly designed head with a chain-link conveyor. The head consists of a rectangular steel frame set on steel runners and two rotating drums armed with spring-loaded teeth. The teeth of the outermost drum rake oysters from the substrate. The teeth of the second drum and water jets impell the oysters to the escalator where they are brought to the surface. Harvest rates of 500 bushels of oysters an hour and 744 bushels of shell an hour have been achieved.

PB80-194103
(Order as PB80-194061, PC **A03/MF A01**)
South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Center.
Development of a Self-Culling Blue Crab Pot,
Peter J. Eldridge,, V. G. Burrell, Jr., and George Steele. Dec 79, 8p CONTRIB-98, NOAA-80042403-4
Included in Marine Fisheries Review, v41 n12 p21-27 Dec 79.

During 1977 and 1978 a series of experiments was conducted to develop a self-culling blue crab pot. A crab pot with two escape ports in the top chamber and one in the bottom chamber reduced the catch of sublegal crabs by 82%. The use of escape ports will reduce culling time of fishermen, reduce law enforcement problems, result in reduced deliveries of illegal crabs to processors, and lower the number of injuries to crabs during the fishing operation.

PB80-194111
(Order as PB80-194061, PC **A03**/MF **A01**)
National Marine Fisheries Service, Highlands, NJ. Sandy Hook Lab.
Composition of Catches Made by Anglers Fishing for Summer Flounder, 'Paralichthys dentatus', from New Jersey Party Boats in 1978,
Darryl J. Christensen, and Walter J. Clifford. Dec 79, 4p NOAA-80042403-5
Included in Marine Fisheries Review, v41 n12 p28-30 Dec 79.

Anglers were interviewed while fishing for summer flounder, Paralichthys dentatus, along the New Jersey coast from party boats. Mean seasonal catch rates for full-day and half-day anglers were 3.15 and 1.86 summer flounder per man per trip, respectively, from 19 June to 1 September 1978. Other fish species made up less than 10% of the catch. A total of 828 summer flounder were measured and ages were determined for 427 specimens. Analysis of the age-length data indicates that II+, III+, IV+, and greater than V+ age summer flounder made up 4.3, 73.0, 20.3, 1.8, and 0.6% of the catch, respectively.

PB80-196686 PC **A09**/MF **A01**
Murray State Univ., KY. Dept. of Biological Sciences.
A Comparative Food Habit Analysis of Channel and Blue Catfishes in Kentucky and Barkley Lakes, Kentucky.
Master's thesis,
Wayne L. Davis. May 80, 185p NOAA-80051502
Prepared in cooperation with Kentucky Dept. of Fish and Wildlife Resources, Frankfort.

In 1967 reports indicated that the growth rate of channel and blue catfish in Kentucky Lake had been declining. Recently commercial fishermen also noticed a decline in the condition of the catfish in their catches. With the past data available and the present concern for the fishery, this study was begun to investigate the causes for this decline. Food habits, diversity of food items, locational, seasonal, and length group variability, selectivity, and diurnal feeding periodicity were examined. A total of 315 channel and 332 blue catfish were taken from Kentucky Lake and 255 channel and 65 blue catfish were taken from Barkley Lake, and their stomach contents were analyzed to determine food habits.

PB80-198237 PC **A06**/MF **A01**
Maine Univ./Univ. of New Hampshire, Durham. Cooperative Institutional Sea Grant Program.
University of Maine/University of New Hampshire Cooperative Institutional Sea Grant Program. Annual Report, January 1-December 31, 1977, January 1-December 31, 1978,
Phyllis Coggins, Nick Cowenhoven, Lisa Douglis, Louise Eklund, and Sara Judd. 1980, 123p NOAA-80050902
Grant NOAA-04-8-M01-79

In 1977 and 1978, the second and third years of the University of Maine/University of New Hampshire Institutional Sea Grant Program reflected the regional nature of the program and the unique problems and opportunities evident in northern New England. Highlights of research completed, underway or planned in the areas of living marine resources development, marine economic research, ocean engineering, marine education, and marine advisory services for each year are presented. An activity budget sheet is included.

PB80-198294 PC **A02**/MF **A01**
Connecticut Dept. of Environmental Protection, Hartford.
Movements of White Perch in the Lower Connecticut River.
Completion rept. Jul 76-Jun 79,
George C. Maltezos, Ronald McMahon, and Mark Leslie. May 80, 22p NOAA-80050721

The white perch is an important sportfish, and commercial species in the lower Connecticut River. A tagging program was conducted to determine the extent of local and seasonal movements, and to examine whether the white perch are indigenous to specific areas within the river. Release and recapture data indicates one mass population of white perch that exhibits not only random movements by one segment of the population prior, during and after spawning but also by another segment of the population in the fall and early spring out of the river system into Central and Western Long Island Sound.

6D. Bionics

N80-26033/4 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Using Representative Knowledge to Guide Decision Making in Automatic Diagnostic Systems Extensoes DA Representacao de Conhecimento Atraves de Regras de Decisao Em Sistemas de Diagnostico Automatico.
A. D. Faria, and P. O. Simoni. Mar 80, 19p INPE-1686-RPE/117-REV
Text in Portuguese; English Summary. Revised. Presented at the 6TH Congr. Brasileiro de Engenharia Biomedica, 24-27 Oct. 1979.

Many automatic medical diagnostic systems use artificial intelligence techniques for the representation and application of knowledge in order to get an approximation for the medical reasoning in the diagnostic process. It was observed that one limitation of these systems is the lack of flexibility in the representation of knowledge. A new representation for knowledge is proposed in the form of decision rules by conditional fuzzy propositions. Through this method the truth values of an attribute can be represented as well as possibility distributions over the universes. A uniform rule evaluation and evidence combinations are also attained. A set of rules for the diagnostic of the urinary tract infection of children was written, for which the proposed technique was applied.

6E. Clinical Medicine

AD-A085 321/8 PC **A04**/MF **A01**
Dwight David Eisenhower Army Medical Center Fort Gordon GA Clinical Investigation Service
Annual Research Progress Report, Fiscal Year 1979,
Andree J. Lloyd. 1 Oct 79, 64p

The Clinical Investigation Service is organized as an independent research, development and teaching service, operating directly under the supervision of the Chief, Professional Services, DDEAMC. It is composed of three sections: (1) The Research Laboratories Section; (2) The Clinical Research Section; and (3) The Southwest Regional Animal Support Facility. The Clinical Investigation Service operates under the guidance of the Clinical Investigation Committee, composed of Chiefs of the following Departments; Department of Medicine, Department of Surgery, Department of Psychiatry and Neurology, Department of Pathology and Department of Family Practice. The Clinical Investigation Service was established to stimulate and provide support for research and development and teaching activities for elements of DDEAMC. Through the Research Laboratories Section this service provides available laboratory facilities and support in terms of academic and technical knowledge. This service instructs, guides and teaches research fellows, residents, other trainees and all other staff in the laboratory related research activities relevant to their requirements.

AD-A085 386/1 PC **A02**/MF **A01**
Boston Univ MA School of Medicine
A Primate Model for the Study of the Interaction of 111 In-Labeled Baboon Platelets with Dacron (Trade Name) Arterial Prostheses,
Allen D. Callow, C. B. Ledig, T. F. O'Donnell, J. J. Kelly, and D. rosenthal. 2 Aug 79, 7p
Contract N00014-79-C-0168
Pub. in Annals of Surgery, v191 n3 p362-366 Mar 80.
No abstract available.

AD-A085 407/5 PC **A03**/MF **A01**
Letterman Army Inst of Research San Francisco CA
Medical Services Annual Historical Report - AMEDD Activities. Calendar Year 1979,
John D. Marshall, Jr., and Helmut F. Hacker. 1979, 49p

Partial Contents: Mission; Organization; Personnel and Administration; Training; Materiel; Construction; Assistance Provided Civilian and other Government Agencies; Improvements and Significant Accomplishments; Inspections, Surveys, and Audits; Conferences; Liaison and Orientation Visits; Unresolved Problems.

AD-A085 413/3 PC **A02**/MF **A01**
Institute for Medical Research Kuala Lumpur (Malaysia)
Antigenic Analysis by Direct Immunofluorescence of 114 Isolated of Rickettsia Tsutsugamushi Recovered from Febrile Patients in Rural Malaysia,
Akira Shirai, Elsie Gan, David M. Robinson, Grahaem W. Brown, and David L. Huxsoll. 18 Jul 79, 10p
Pub. in Japanese Jnl. of Medical Science and Biology, v32 n6 p337-334 Dec 79.
No abstract available.

AD-A085 415/8 PC **A02**/MF **A01**
Institute for Medical Research Kuala Lumpur (Malaysia)
Clinical Responses of Silvered Leaf Monkeys to Infection with Selected Strains of Rickettsia tsutsugamushi,
Akira Shirai, R. D. Montrey, R. M. Werner, S. Arimbalam, and D. L. Huxsoll. 29 Jan 79, 5p
Grant DAMD17-78-G-9440
Pub. in Jnl. of Infectious Diseases, v140 n5 p811-814 Nov 79.
No abstract available.

AD-A085 419/0 PC **A02**/MF **A01**
Institute for Medical Research Kuala Lumpur (Malaysia)
Comparison of Experimental Rickettsia tsutsugamushi Infections in Silvered Leaf (Presbytis cristatus) and Cynomolgus (Macaca fascicularis) Monkeys,
Akira Shirai, Richard D. Montrey, Robert M. Werner, S. Arimbalam, and David L. Huxsoll. 18 Jul 79, 10p
Grant DAMD17-78-G-9440
Pub. in Japanese Jnl. of Medical Science and Biology, v32 n6 p345-351 Dec 79.
No abstract available.

AD-A085 539/5 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Effects of 16, 16-Dimethyl PGE2 on Bile-Induced Increases in H+ Permeability of Rabbit Esophagus,
John W. Harmon, Lawrence F. Johnson, and Corrine L. Maydonovitch. 1980, 4p
Pub. in Advances in Prostaglandin and Thromboxane Research, v8 p1577-1579 1980.
No abstract available.

AD-A085 540/3 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Gamma-Irradiated Scrub Typhus Immunogens: Analysis for Residual, Replicating Rickettsias,
George H. G. Eisenberg, Jr., Joseph V. Osterman, and Edward H. Stephenson. 1980, 4p
Pub. in Infection and Immunity, v28 n1 p295-297 Apr 80.
No abstract available.

AD-A085 541/1 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Host Defenses in Experimental Rickettsialpox: Genetics of Natural Resistance to Infection,
George W. Anderson, Jr., and Joseph V. Osterman. 1980, 7p

Pub. in Infection and Immunity, v28 n1 p132-136 Apr 80.

No abstract available.

AD-A085 545/2 PC **A06/MF A01**
Naval Health Research Center San Diego CA
Recordings and Analysis of Brain Activity,
Laverne C. Johnson. 1980, 104p Rept no. NAVHLTHRSCHC-78-4
Pub. in Techniques in Psychophysiology, Chapter 6. Measurement, Quantification, and Analysis of Cortical Activity, p329-430 1980.

No abstract available.

AD-A085 546/0 PC **A02/MF A01**
Naval Dental Research Inst Great Lakes IL
Determination, Carbon-13 Nuclear Magnetic Resonance Spectroscopy, of the Composition of Glucans Synthesized by Enzymes of the Cariogenic Organism Streptococcus mutans,
Pierre Colson, Harold C. Jarrell, Burton L. Lamberts, and Ian C. P. Smith. 29 Jul 78, 12p Rept no. NDRI-PR-79-10
Pub. in Carbohydrate Research, v71 p265-272 1979. Also available as NRC-PUB-17205.

No abstract available.

AD-A085 560/1 PC **A02/MF A01**
Naval Dental Research Inst Great Lakes IL
Effects of Two Dextranase Preparations on Dental Caries and Alveolar Bone Loss in Hamsters,
L. G. Simonson, D. Jackola, B. L. Lamberts, and E. P. Leonard. 1980, 8p Rept no. NDRI-PR-80-02
Pub. in Pharmacology and Therapeutics in Dentistry, v4 p47-51 1979.

No abstract available.

AD-A085 561/9 PC **A02/MF A01**
Naval Dental Research Inst Great Lakes IL
Periodontitis in the Rice Rat (Oryzomys palustris),
Edward P. Leonard. 1980, 7p Rept no. NDRI-PR-80-03
Pub. in The American Jnl. of Pathology, v96 p643-646 1979.

No abstract available.

AD-A085 594/0 PC **A02/MF A01**
Defence Research Establishment Suffield Ralston (Alberta)
Procedures for Leakage Testing and Disinfection of Containment Bed Isolators and Containment Aircraft Transit Isolators.
Technical note,
A. R. Lejeune. May 80, 13p Rept no. DRES-TN-460

Procedures are described for leakage testing and decontamination of patient isolators. Techniques are given for use with both the Containment Bed Isolator (CBI) and the Containment Aircraft Transit Isolator (CATI). Some alternative methods for both types of procedures are also suggested. (Author)

AD-A085 621/1 PC **A02/MF A01**
Boston Univ MA School of Medicine
The Use of Frozen-Washed Red Blood Cells,
Thomas R. Kinney, and C. Robert Valeri. 1980, 15p
Contract N00014-79-C-0168
Pub. in Transfusion Therapy, Chapter 11. The Fetus, Infant, and Child, p145-157 n.d.

No abstract available.

AD-A085 622/9 PC **A02/MF A01**
Boston Univ MA School of Medicine
Therapeutic Effectiveness and Safety of Outdated Human Red Blood Cells Rejuvenated to Restore Oxygen Transport Function to Normal, Frozen for 3 to 4 Years at -80C, Washed, and Stored at 4 C for 24 Hours Prior to Rapid Infusion,
C. Robert Valeri, C. G. Zaroulis, J. J. Vecchione, D. A. Valeri, and J. Anastasi. 1 Dec 78, 14p
Contracts N00014-70-C-0111, N00014-79-C-0168
Pub. in Transfusion, v20 n2 p159-170 Mar-Apr 80.

No abstract available.

AD-A085 782/1 PC **A03/MF A01**
Frank J Seiler Research Lab United States Air Force Academy CO
The Effect of Hyperbaric Oxygen on the Growth of Mucor sp. Aspergillus fumigatus.
Summary rept.,
William J. Cairney. Feb 80, 28p Rept no. FJSRL-TR-80-004

Mucor sp. and Aspergillus fumigatus isolated from different human lung infections were observed in vitro for macroscopic and microscopic growth characteristics at varying hyperbaric oxygen levels and for various exposure times and intervals. Both organisms were completely inhibited in oxygen at 3 atmospheres absolute and were at least retarded in all growth processes when subjected to hyperbaric oxygen according to exposure tables routinely used for treating Clostridial gas gangrene. Overall experimental results provide in vitro basis for use of compression chamber therapy in treatment of Mucormycosis and Aspergillosis. (Author)

HRP-0030579/7 Not available NTIS
Ganong (W. L.) Co., Chapel Hill, NC.
HELP (Healthcare Agency, Educational and Learning Program) with Nursing Audit and Quality Assurance. A Management Guide.
Rept. no. 2,
Joan Watson Ganong, and Warren L. Ganong. c1975, 133p ISBN-0-933036-02-7
See also number 5, HRP-0030582.
Available from W. L. Ganong Company, Professional Village, P. O. Box 2727, Chapel Hill, NC 27514.

A guide for managers implementing nursing audit and quality assurance programs is presented. Self-administered tests, evaluations, and exercises are included in the study format. Among the topics explored are nursing audit definitions and terminology, organization of staff for quality assurance programs, the development of standards and criteria, techniques and systems for audit and quality assurance, retrospective audits, quality control audits, guidelines for involving nursing personnel, implementation and reporting of audit results, public health nursing audit, and the integration of nursing audits with management techniques. A framework for nursing management, working committee relationships, working committee members, nursing process, charting, the six-step nursing audit process, the nursing workload, and patient care management concepts of nursing are illustrated. Reference sheets are provided for the illustration of standards for nursing care plans, quality control checks, care plans, audit sheets, flow sheets, planning sheets, nursing data bases, audit reports, nursing and audit standards for specific patient and disease types, and one hospital's audit methods. A bibliography is included.

HRP-0030582/1 Not available NTIS
Ganong (W. L.) Co., Chapel Hill, NC.
HELP (Healthcare Agency, Educational and Learning Program) with ROPEP, A Management Guide to a Results-Oriented Performance Evaluation Program.
Rept. no. 5,
Joan Watson Ganong, and Warren L. Ganong. c1974, 105p
See also number 6, HRP-0030583.
Available from W. L. Ganong Company, Professional Village, P. O. Box 2727, Chapel Hill, NC 27514.

The manual provides a results-oriented performance evaluation program (ROPEP) for use by health care and nursing managers. Self-administered tests, evaluations, and exercises are included in the lesson formats. The lessons cover the concepts of performance evaluation, the four phases of ROPEP, and the creation of a high performance climate. The four phases of ROPEP are preparation of performance descriptions, initial application, the first evaluation cycle, and the work evaluation cycle. Performance descriptions, head nurse performance descriptions, performance evaluation, the exception principle, the critical incident technique, the ROPEP management by objectives procedure, the cycles of management functions, and the management process are discussed. Examples of inadequate employee appraisal forms, a performance description worksheet, performance self-evaluation forms, an objectives worksheet, and performance descriptions are presented. Also included are a comparative diagram of job and employee evaluation, a managerial guide to the use of performance descriptions, an outline of management by objectives (MBO) for nursing, and the six steps of the ROPEP/MBO procedure.

HRP-0030583/9 Not available NTIS
Ganong (W. L.) Co., Chapel Hill, NC.
HELP (Healthcare Agency, Educational and Learning Program) with Wide-Track Careers in Nursing, Opening Career Paths in Healthcare Agencies for Nurse Specialists and Generalists. A Management Guide.
Rept. no. 6,
Joan Watson Ganong, and Warren L. Ganong. c1977, 152p
See also number 2, HRP-0030579.
Available from W. L. Ganong Company, Professional Village, P. O. Box 2727, Chapel Hill, NC 27514.

The guide is designed to assist nurse managers and health care administrators who wish to initiate a wide-track careers program to secure the maximum possible return on their investment in human resources. A wide-track careers program in nursing is defined as a system for providing selective career options in the management, educational, and clinical tracks of nursing. These options are provided within a single health care agency in a manner that allows moving from one track to another and provides progression in earnings and responsibility. Self-administered tests, evaluations, and exercises are included in a series of lessons. The lessons address the wide-track careers concept, career mobility versus employee care planning, definition of performance levels, development of policies and procedures, and implementation of the plan. A model for wide-track nursing careers, the work world of the nurse manager, the nursing organization inventory checklist, a performance description format, a nursing procedures activities list, and a framework for nursing management are illustrated. Appendixes are included which present examples of performance descriptions, criteria for levels of nursing service personnel, and nursing task lists.

HRP-0901609/8 MF **A01**
North Louisiana Health Systems Agency, Inc., Shreveport.
Health Systems Plan-1979/1984 and Annual Implementation Plan-1979/1980. Second Edition.
1979, 464p
Available microfiche only because of poor quality.

This is the Second Generation Health System Plan (HSP) and Annual Implementation Plan (AIP) for the residents of the North Louisiana Health Service Area. The five year HSP horizon is now 1984, whereas for the first generation it was 1983. The one year AIP presents actions for accomplishment during the period May, 1979 - April, 1980. The Governing Board of North Louisiana Health Systems Agency formally adopted this second generation HSP/AIP on December 14, 1978. Revision of the first generation HSP/AIP has been accomplished in accordance with the planning process adopted by the Governing Board. The second generation HSP/AIP has been built upon the foundation of the first generation, by recognizing significant changes in the community but also maintaining the sense of priority, direction and progress toward long range goals established in that first generation HSP/AIP.

HRP-0902052/0 CP **T02**
Bureau of Health Professions, Hyattsville, MD. Div. of Health Professions Analysis.
Bureau of Health Professions Area Resource File (ARF) Tape.
Data file,
Carol A. Semyan, and Roger B. Cole. Mar 80, mag tape HRA/DF-80/001
Supersedes Rept. no. HRA/DF-79/001, HRP-0901717.
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set,

track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, HRP-0902053.

The Bureau of Health Professions' Area Resource File is a county-unit data base with over 3,000 data elements for each county in the U.S., with the exception of Alaska for which there is a State total, and certain Independent Cities which have been combined into their appropriate counties. Altogether, there are a total of 3,078 records on the File. The purpose of the ARF is to summarize data from many sources into a single file to facilitate health manpower analysis. The data elements include, in part: (1) County descriptors (Names, Fips, AHA, HSA, PSRO, SMSA, SEA, BEA, city size, shortage area designation, etc., codes); (2) Health Professions data (M.D., DDS, Veterinarians, Pharmacists, Optometrists, Podiatrists, R.N., L.P.N., and Dental hygienists); (3) Health Facility data (hospital size, type, utilization, and staffing and services; Nursing home data); (4) Population data (Size, composition, employment, housing, natality, mortality by cause, by sex and race, and by age; crime data); (5) Health Training data (Training programs, enrollments, and graduates by type); (6) Expenditure data (Hospital expenditures, Medicare enrollments and reimbursements, medicare prevailing charge data); (7) Economic data (Total, per capita, and median income; income distribution, and AFDC recipients); (8) Environment data (Land area, large animal population, elevation, latitude and longitude of population centroid, water hardness index, and climatic data).

HRP-0902053/8 PC **A09**/MF **A01**
Applied Management Sciences, Inc., Silver Spring, MD.
Bureau of Health Professions Area Resource File (ARF). User Documentation and Technical Documentation.
Quarterly rept. Mar-Apr 80.
Apr 80, 190p HRA/DF-80/001A
Contract PHS-HRA-232-79-0097
For system on magnetic tape, see HRP-0902052.

The Area Resource File (ARF) is a county-based data file, summarizing secondary data from a wide variety of sources, which are useful for analysis of the health care system. It contains over 3,000 data elements for all counties in the U.S., with exception of Alaska. Data elements include county descriptor codes, health professions data, health facility and health training data, population and economic data, and limited data on vital statistics, industry, housing, expenditure and environmental factors. This document provides detailed ARF source information.

INIS-mf-5375 PC **A03**/MF **A01**
Erlangen-Nuernberg Univ. (Germany, F.R.). Fachbereich Medizin.
Measurement of the Dose Distribution at the Gammatron in Homogeneous Water Phantoms with Films and Ionization Chambers.
Diss. (M.D.),
B. Mark. 9 Feb 78, 43p
In German.
U.S. Sales Only.

The check of the analytic function for the depth-dose-curve by means of computer calculations of films shows, the dose decreases with increasing phantom depth. Outside of the effective beam the deviation between the values is up to 100 per cent. The analytic function could be verified well ionometrically. The transversal distributions were also checked. A good agreement was found between the ionometrical and film-dosimetrical values. (Atomindex citation 11:499901)

INIS-mf-5380 MF **A01**
Freie Univ. Berlin (Germany, F.R.). Fachbereich 1-3 Humanmedizin.
Negative Brain Scintiscan in Brain Tumours.
Diss. (M.D.),
K. G. Dalke. 26 Apr 78, 38p
In German.
U.S. Sales Only. Microfiche copies only.

On the basis of 53 histologically verified and two histologically unidentified brain tumours, the author examined the reasons for these wrongly negative scintiscans. EEGs and angiographies carried out at about the same time were taken into account and compared with the scintigraphic findings. (Atomindex citation 11:499940)

INIS-mf-5381 MF **A01**
Giessen Univ. (Germany, F.R.). Fachbereich Humanmedizin.
Investigations of Serum HPL During Pregnancy Using Two Different Radioimmunoassays.
Diss. (M.D.),
H. Stracke. 1978, 154p
In German.
U.S. Sales Only. Microfiche copies only.

The interassay investigations showed that it is absolutely necessary to standardize the HPL antisera as well as the standard sera, as it is otherwise impossible to compare and interpret the findings of different HPL radioimmunoassays. The investigations have shown that in addition to conventional clinical examinations and laboratory test methods (urine estriol determination, DHEAS-dehydroepiandrosterone sulphate test-, urine pregnandiol determination, and determination of heat-resisting alkaline serum phosphatase), HPL concentration determination is a parameter of the nutritive function of the placenta. (Atomindex citation 11:499987)

INIS-mf-5385 MF **A01**
Marburg Univ. (Germany, F.R.). Fachbereich Humanmedizin.
Regulation Examinations to Determine the Success of exp 131 I Therapy.
Diss. (M.D.),
H. Kueppers. 14 Jul 78, 62p
In German.
U.S. Sales Only. Microfiche copies only.

97 patients with diffuse or nodular struma and 42 patients with autonomous adenoma were re-examined who had been treated with exp 131 I for hyperthyroidism between 1970 and 1975. Besides in-vitro determinations of T sub 4 , NTR, T sub 3 , and TSH, the TcTU was determined 20 min. p.i. in all patients. The TRH test and in most patients also the suppression test with 14 x 200 mu g T sub 4 were carried out as regulation tests. In the group of treated hyperthyroid strumae, a clinically hyperthyroid picture was correlated with the in vitro values in 3 patients. 47 other patients had increased T sub 3 values but no hyperthyroid symptoms. 8 patients were hypothyroid, and 17 patients had latent hypothyroidism. The TRH test was positive in 49 cases and negative in 48 cases. The suppression test showed a residual autonomy in 63% of the patients. 10 patients with positve TRH test results had negative suppression test results. (Atomindex citation 11:500034)

INIS-mf-5386 MF **A01**
Freie Univ. Berlin (Germany, F.R.). Fachbereich 1-3 Humanmedizin.
Elaboration of an SPSS Program for the Analysis of Clinical Results of Radiotherapy and Chemotherapy after Partial Synchronisation of the Cell Cycle.
Diss. (M.D.),
H. W. Klopp. 16 Jan 78, 65p
In German.
U.S. Sales Only. Microfiche copies only.

Radiotherapy and chemotherapy after partial synchronization are carried out at the radiotherapy centre of Charlottenburg hospital. At the end of August, 1974, 214 patients had been treated according to this principle. For a more efficient evaluation of the therapeutical results, electronic data processing was employed for the first time. In particular, pieces of information and new therapeutical findings will be transmitted to a central unit on punched cards via a data display station. (Atomindex citation 11:500005)

INIS-mf-5389 MF **A01**
Marburg Univ. (Germany, F.R.). Fachbereich Humanmedizin.
Behaviour of Hormone Parameters and Equivalent Iodide Clearance (TcTu) on Suppressive T sub 4 Treatment of Enthyroid Struma.
Diss. (M.D.),
W. Greis. 22 Sep 78, 33p
In German.
U.S. Sales Only. Microfiche copies only.

84 patients with euthyroid diffuse struma were stabilised at the individually necessary thyroxine dose by means of TcTU, T sub 4 , and NTR. As long-term medication, 100 mu g l-thyroxin were required in 143% of the patients, 150 mu g in 83.3% of the patients, and 200 mu g in 2.4% of the patients. After 8 to 12 weeks of therapy, the TcTU as an estimate of the iodide clearance was suppressed to 0.1 to 3.5 (x +- s). T sub 4 and NTR values were near the upper limit of the normal at a normal T sub 3 level. After administration of 150 mu g thyroxine per day for 12 weeks and 200 mu g thyroxine for 4 weeks, TcTU is suppressed to a comparable extent while the weaker suppressive effect of a 12 weeks' medication with 100 mu g thyroxine could not be improved even by a prolonged therapy. After one year of treatment, calculations of the thyroid surface in scintiscans showed a successful therapy in 82% of the patients while the circumference of the neck had become smaller only in 60% of the patients. Therapy was generally less successful in patients over 18 years of age. (Atomindex citation 11:499947)

LBL-10022 PC **A07**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Biology and Medicine Division Annual Report, 1978-1979.
1979, 128p
Contract W-7405-ENG-48

Summaries of research projects conducted during 1978 and 1979 are presented. Subject areas include research medicine, cancer research, environmental physiology, radiation biophysics, and structural biophysics. (ERA citation 05:021263)

N80-26032/6 PC$7.00
National Aeronautics and Space Administration, Washington, DC.
Aerospace Medicine and Biology. A Continuing Bibliography, Supplement 207.
Jun 80, 65p NASA-SP-7011(207)

This bibliography lists 184 reports, articles, and other documents introduced into the NASA scientific and technical information system in May 1980.

ORNL/TM-7223 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Nuclear Medicine Technology Progress Report for Quarter Ending December 31, 1979.
F. F. Knapp, Jr. Apr 80, 27p
Contract W-7405-ENG-26

Platinum-195m-labeled cis-dichloro-trans-dihydroxy-bis-(isopropylamine)-platinum(IV) (CHIP) was prepared for the first time. This second-generation platinum antitumor agent appears superior to the widely used cis-dichlorodiammineplatinum(II) (cis-DDP) since the dose-limiting nephrotoxicity associated with cis-DDP therapy is not encountered. Platinum-195m-labeled CHIP is being used to determine the tissue-distribution, excretion, and other pharmacological properties of this new drug. Studies of the heart uptake in rats of exp 75 Se and /sup 123m/Te-labeled long-chain fatty acids have continued. The greater heart uptake of /sup 123m/Te-9-telluraheptadecanoic acid compared with the selenium analog, exp 75 Se-9-selenaheptadecanoic acid, was confirmed. Radiation dose estimates for a new adrenal imaging agent, /sup 117m/Sn-23-(trimethylstanna)-24-nor-5 alpha -cholan-3 beta -ol (23-TSC) have been completed. Tissue distribution and excretion data for /sup 117m/Sn-23-TSC were used to extrapolate the radiation dose values to humans. The calculated radiation dose values for /sup 117m/Sn-23-TSC are: adrenals, 83 rads/mCi; total body, 0.77 rad/mCi/; and ovaries, 4.4 rads/mCi. These values are considerably lower than similar estimates for a variety of other radiolabeled steroids and suggest that /sup 117m/Sn-23-TSC may be an attractive new agent for adrenal visualization in humans. The diffusion chamber assay system has been further assessed as a technique to determine the toxicity of As sub 2 O sub 3 administration on the proliferation of cells within chambers implanted in the peritoneal cavities of rats and hamsters. Both human embryonic lung cells and human nasopharyngeal carcinoma cells were used in the studies. (ERA citation 05:021268)

PB80-191349 CP **T03**
Mathematica Policy Research, Inc., Princeton, NJ.

Survey Data of Medical Group Practices Study: Formatted Data Tapes.
Data file,
George Carcagno, Steven B. Just, and Franklin B. Caffee. 30 Jun 79, 2p DHEW/DF-80/004, NCHSR-80-32
Contract PHS-HRA-106-74-0119
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB80-191356.

This study consists of two files (one each on two reels) which were produced as part of a nationwide survey of group medical practices in the United States. The objective of the survey was to develop a data base for a series of proposed analyses on the economics of group practice. The types of medical groups surveyed were: general practice, internal medicine, pediatrics, general surgery and obstetrics/gynecology. The group file contains data from the Main Group Questionnaire which includes data on the groups' legal and administrative structure, medical and support staff, and income-distribution scheme. In total, the file contains information on 957 group practices. The physician file contains all of the data on the group file in addition to a survey of the groups' physicians concerning scheduling of patient appointments. In total, the file contains information on 6,342 physicians associated with the 957 group practices.

PB80-191356 PC **A23**/MF **A01**
Mathematica Policy Research, Inc., Princeton, NJ.
Analysis of Economic Performance in Medical Group Practices; Final Report and Executive Summary.
Final rept. 29 Jun 74-30 Jun 79,
Philip J. Held, and Uwe Reinhardt. Jul 79, 540p DHEW/DF-80/004A, NCHSR-80-31
Contract PHS-HRA-106-74-0119
For system on magnetic tape, see PB80-191349.

The objective of the study was to develop a data base for a series of proposed analyses on the economics of group practice and to determine the veracity of some commonly held beliefs. Two questions of particular interest were whether economies of scale exist in the delivery of health care services and whether various income distribution incentives impact on the economic performance of physicians. The study failed to detect any significant relationship between group size and overhead costs and concluded that this topic has been unduly emphasized. Ancillary facilities such as hospitals, pharmacies, and the like, often associated with large group size and increased income, were found to be group-owned less than ten percent of the time. Administrative costs, which account for 72 percent of the aggregate labor cost of groups, were found to be substantially reduced by employing nonmedical administrative personnel, which confirms previous findings. For example, having three aides rather than none increases hourly productivity by about 40 percent.

PB80-192321 PC **A05**/MF **A01**
Wisconsin Univ.-Madison. Medical School.
Prevalence of Specific HLA Antigens and Lung Disease.
Final rept. 30 Jun 76-31 Dec 78,
John Rankin. 12 May 80, 76p NIH-N01-HR-82936-F
Contract N01-HR-6-2936
See also report dated 27 May 77, PB-267 685.

The frequency of serologically detectable HLA antigens in subjects with Farmer's Lung Disease, alternaria sensitive and perennial non-allergic asthmatics were compared to age and sex-matched controls from the same geographic area. No associations were found between any of the SD HLA antigens tested and these diseases.

PB80-193626 PC **A07**/MF **A01**
Boston Univ., MA.
Large Medicaid Practices: Are They Medicaid Mills.
Final rept.,
Janet B. Mitchell, and Jerry Cromwell. Mar 80, 129p DHEW/PUB/HCFA-03020
Contract DHEW/HCFA-500-78-0051
Prepared in cooperation with Health Economic Research, Inc., Boston, MA. Report on Health Care Financing Grants and Contracts.

The report examines the characteristics of office-based medical practices where 30 percent or more of the physicians' patients received Medicaid. The report was prepared by Dr. Janet Mitchell and Dr. Jerry Cromwell in concert with the trustees of the city of Boston Health and Hospitals and was performed under a contract with the Health Care Financing Administration. The contract entitled 'Analysis of Survey Data on Physician Practice Costs and Income', provided for analysis of data from a 1976 survey of 3482 office based physicians conducted by the National Opinion Research Center.

PB80-193774 PC **A06**/MF **A01**
Texas Univ. at Austin. Dept. of Chemical Engineering.
Continuous Ambulatory Peritoneal Dialysis.
Final rept. 1 Feb 78-31 Jul 79,
Robert P. Popovich, Jack W. Moncrief, and Karl D. Nolph. 1 Feb 80, 109p AK-3-6-2211-F
Contract N01-AM-6-2211
Prepared in cooperation with Missouri Univ.-Columbia, and Austin Diagnostic Clinic, TX. See also report dated 7 Apr 78, PB-281 035.

The maintenance of chronic uremic patients by means of Continuous Ambulatory Peritoneal Dialysis (CAPD), has been evaluated over several years in a cooperative study. Numerous articles outlining the results of this contract have been published, and are listed in the section on publications. CAPD has been found to accomplish metabolic control of uremia, maintain blood chemistries at stable, acceptable levels, achieve fluid balance, and improve blood pressure control. Serum albumin concentrations have remained consistently in the low-normal range in spite of significant losses in the dialysate. These losses are replaced by adequate dietary intake of protein. Patients on CAPD generally have improved appetite and experience an increased sense of well-being in contrast to other methods of dialysis. Peritonitis has traditionally been the major problem with all forms of peritoneal dialysis. The CAPD technique has been improved since the dialysis solution became available in plastic bags, significantly reducing the incidence of peritonitis. CAPD can be performed at home by the patient without any assistance or machinery, and is much less expensive than other forms of dialysis.

PB80-194517 PC **A02**/MF **A01**
Yale Univ., New Haven, CT. School of Medicine.
Carbohydrate Intolerance in Uremia: Insulin Resistance and Hypersensitivity to Glucagon.
Final rept. 12 Jun 74-11 Jun 78,
Philip Felig, Vijay Soman, Robert Sherwin, Fredrick O. Finkelstein, and Rosa Hendler. 20 May 80, 22p AK-1-4-2221-F
Contract NO1-AM-4-2221
See also report dated 3 Aug 76, PB-284 687.

The pathogenesis of glucose intolerance in uremia was examined with the glucose clamp technique. In conclusion, glucose intolerance is universally present in uremic subjects and results primarily from peripheral tissue insensitivity to insulin. Insulin secretion is usually enhanced in an attempt to compensate for this insulin resistance but in occasional subjects uremia also inhibits beta cell sensitivity to glucose. Hepatic glucose production is unaffected by uremia. The lack of correlation between insulin binding and tissue sensitivity to insulin suggest that the cellular mechanism accounting for the insulin resistance is probably the result of a defect in intracellular metabolism or in the glucose transport system.

PB80-195415 CP **T99**
Science and Education Administration, Hyattsville, MD. Consumer Food Economics Inst.
Individual Intake Data from 1965 Nationwide Food Consumption Survey.
Data file,
Eleanor Pao, and Brucy Gray. 15 May 80, mag tape USDA/DF-80/005
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products for price.

This file contains food and nutrient intake for over 14,000 men, women, and children included in the nationwide USDA survey of food intake of individuals carried out in the spring of 1965. The interview was conducted in the home and the household respondent, usually the homemaker, was asked to recall the previous day's food intake for selected members in the household. One-half of the individuals 20-64 years of age were systematically selected. Information was collected over all days of the week, including Saturday and Sunday. Data included for each item of food reported the kind, quantity (in grams), time eaten, and, for foods not from the household supply, the place of eating, type of service, and food cost, if bought. For each food item reported, there is also listed it's equivalent value for food energy, protein, fat, carbohydrate, calcium, iron, vitamin A value, thiamin, riboflavin, niacin, and ascorbic acid. Characteristics available for each individual are sex, age, estimated height and weight, use of vitamin or mineral supplements, and, for women, pregnancy and lactation status.

PB80-195472 PC **A05**/MF **A01**
Abt Associates, Inc., Cambridge, MA.
National Hospital Rate-Setting Study. Volume I. Case Study of Prospective Reimbursement in Arizona.
Interim rept.,
James Boland, and Helena Reilly. Nov 79, 100p 79-4(A), DHEW/PUB/HCFA-80-03029
Contract DHEW/HCFA-500-78-0036
See also Volume 2, PB80-195480. Prepared in cooperation with Policy Analysis, Inc., Brookline, MA. Report on Health Care Financing Grants and Contracts.
Also available in set of 9 reports PC E20, PB80-195464.

This report is one of nine (9) case study reports (Arizona, Connecticut, Maryland, Massachusetts, Minnesota, New Jersey, New York, Washington, and Western Pennsylvania) written as part of the National Hospital Rate-Setting Study. The report examines in detail the adoption, implementation, review process and legal challenges of the prospective reimbursement system in Arizona. In addition, linkages between rate setting agencies and planning groups, hospital associations, third party payors and unions are all examined. The case study also presents a preliminary, qualitative analysis of the potential rigor and equity of the rate setting system.

PB80-195480 PC **A04**/MF **A01**
Abt Associates, Inc., Cambridge, MA.
National Hospital Rate-Setting Study. Volume II. Case Study of Prospective Reimbursement in Connecticut.
Interim rept.,
Gary Gaumer, Michael Sumner, and James Boland. Nov 79, 67p 79-4(B), DHEW/PUB/HCFA-80-03030
Contract DHEW/HCFA-500-78-0036
See also Volume 1, PB80-195472 and Volume 3, PB80-195498. Prepared in cooperation with Policy Analysis, Inc., Brookline, MA. Report on Health Care Financing Grants and Contracts.
Also available in set of 9 reports PC E20, PB80-195464.

Prospective reimbursement in Connecticut has been administered since 1973 by an independent state agency, the Commission on Hospitals and Health Care (CHHC). The Commission reviews and approves rate adjustments for nursing homes, conducts prospective budget review for hospitals and has responsibility for Certificate of Need. CHHC has seventeen part-time commissioners and a permanent staff, which is responsible for detailed budget review. Reviews for all hospitals in the state occur during the period July 1 to October 1 of each year.

PB80-195498 PC **A06**/MF **A01**
Abt Associates, Inc., Cambridge, MA.
National Hospital Rate-Setting Study. Volume III. Case Study of Prospective Reimbursement in Maryland.
Interim rept.,
Nancy Worthington, Karen Tyson, and Martin Chin. Nov 79, 112p 79-4(C), DHEW/PUB/HCFA-80-03031
Contract DHEW/HCFA-500-78-0036

See also Volume 2, PB80-195480 and Volume 4, PB80-195506. Prepared in cooperation with Policy Analysis, Inc., Brookline, MA. Report on Health Care Financing Grants and Contracts.
Also available in set of 9 reports PC E20, PB80-195464.

Authorized by legislation passed in 1971, the Health Services Cost Review Commission (HSCRC) in Maryland is located in the Department of Health and Mental Hygiene (DHMH) but functions as an independent agency. Its budget is part of the overall budget for DHMH, but its decisions are not subject to review and approval by DHMH. The Commission consists of seven part-time commissioners and a permanent staff. HSCRC hires most of its staff independently of Civil Service and has had a very low staff turnover since its inception.

PB80-195506 PC **A06**/MF **A01**
Abt Associates, Inc., Cambridge, MA.
National Hospital Rate-Setting Study. Volume IV. Case Study of Prospective Reimbursement in Massachusetts.
Interim rept.,
Renee Weinstein Walter, and Judy DeMarco. Nov 79, 116p 79-4(D), DHEW/PUB/HCFA-80-03032
Contract DHEW/HCFA-500-78-0036
See also Volume 3, PB80-195498 and Volume 5, PB80-195514. Report on Health Care Financing Grants and Contracts.
Also available in set of 9 reports PC E20, PB80-195464.

Although the Massachusetts Rate Setting Commission (MRSC) has been in existence since 1968, it did not begin prospective budget review and rate setting for hospitals until 1974. An independent state agency, MRSC also has rate-setting responsibility for institutions other than hospitals (e.g., nursing homes, community health centers, day care centers). Three full-time commissioners are appointed by the Governor and are supported by a full-time staff. MRSC operates two distinct prospective reimbursement programs for hospitals. Under one program, prospective payment rates are set for Medicaid patients. Under the other (referred to as the 409 program) MRSC prospectively reviews and approves hospital budgets to contain the increases in charges paid by commercially insured and uninsured patients.

PB80-195514 PC **A04**/MF **A01**
Abt Associates, Inc., Cambridge, MA.
National Hospital Rate-Setting Study. Volume V. Case Study of Prospective Reimbursement in Minnesota.
Interim rept.,
A. James Lee, and Gail Jensen. Nov 79, 63p 79-4(E), DHEW/PUB/HCFA-80-03033
Contract DHEW/HCFA-500-78-0036
See also Volume 4, PB80-195506 and Volume 6, PB80-195522. Report on Health Care Financing Grants and Contracts.
Also available in set of 9 reports PC E20, PB80-195464.

A voluntary prospective reimbursement program began in Minnesota in 1974 under the administration of the Minnesota Hospital Association (MHA). Legislation passed in 1976 required all hospitals to submit proposed budgets for review, but compliance with the findings of the review process is still voluntary. MHA still operates the program for all but one hospital, under power delegated to it by the Department of Health (MDH). One small hospital in the state submits its budget for annual review by staff of the Department of Health. MHA staff examine budget proposals for each of 15 functional cost categories (e.g., salaries, medical supplies, interest expense) for changes which may be out of line with previous performance or expected inflation. Official review of budgets and the preparation of recommendations are carried out by six external Rate Review Panels. Each panel consists of three hospital representatives, two third-party representatives and two consumer representatives.

PB80-195522 PC **A06**/MF **A01**
Abt Associates, Inc., Cambridge, MA.
National Hospital Rate-Setting Study. Volume VI. Case Study of Prospective Reimbursement in New Jersey.
Interim rept.,
Nancy Worthington, Jerry Cromwell, Gilbey Kamens, and James Kanak. Nov 79, 105p 79-4(F), DHEW/PUB/HCFA-80-03034
Contract DHEW/HCFA-500-78-0036
See also Volume 5, PB80-195514 and Volume 7, PB80-195530. Prepared in cooperation with Policy Analysis, Inc., Brookline, MA. Report on Health Care Financing Grants and Contracts.
Also available in set of 9 reports PC E20, PB80-195464.

Prospective reimbursement in New Jersey began in 1969 as a voluntary program under the auspices of the New Jersey Hospital Association but was converted in 1974 into a mandatory program under the administration of the Department of Health. When the current rate-setting program was deliberately placed in the Department of Health, an effort was made to maximize coordination between rate setting and other departmental functions--health plan development and Certificate of Need. Budget reviews and negotiation with hospitals are conducted by agency staff. Appeals are directed to an administrative hearing officer in the Department of Health and ultimately may go to the New Jersey court system.

PB80-195530 PC **A04**/MF **A01**
Abt Associates, Inc., Cambridge, MA.
National Hospital Rate-Setting Study. Volume VII. Case Study of Prospective Reimbursement in New York.
Interim rept.,
Diane E. Hamilton, and Gilbey Kamens. Nov 79, 75p 79-4(G), DHEW/PUB/HCFA-80-03035
Contract DHEW/HCFA-500-78-0036
See also Volume 6, PB80-195522 and Volume 8, PB80-195548. Prepared in cooperation with Policy Analysis, Inc., Brookline, MA. Report on Health Care Financing Grants and Contracts.
Also available in set of 9 reports PC E20, PB80-195464.

Since the inception of the program in 1970, the Department of Health has been responsible for prospective reimbursement in New York. The Department determines procedural regulations, sets rates and hears appeals for hospital reimbursement by Medicaid. The Downstate Blue Cross plan and a consortium of the Upstate plans set rates for Blue Cross patients, but the Department of Health must approve both the procedures used and the actual rates set by the Blue Cross programs. Since 1978 the annual inflation allowance developed by the Department for Medicaid rate setting has been used as a ceiling on percentage increases in the rates paid by charge-based payors. Thus, only rates for Medicare patients are not set, approved or limited by the policies and procedures of the Department of Health.

PB80-195548 PC **A05**/MF **A01**
Abt Associates, Inc., Cambridge, MA.
National Hospital Rate-Setting Study. Volume VIII. Case Study of Prospective Reimbursement in Washington.
Interim rept.,
Diane E. Hamilton, Renee Weinstein Walter, and A. James Lee. Nov 79, 91p 79-4(I), DHEW/PUB/HCFA-80-03036
Contract DHEW/HCFA-500-78-0036
See also Volume 7, PB80-195530 and Volume 9, PB80-195555. Report on Health Care Financing Grants and Contracts.
Also available in set of 9 reports PC E20, PB80-195464.

The Washington State Hospital Commission (WSHC) was created as an independent commission by legislation passed in 1973. Prospective reimbursement was not actually implemented until 1975. The Commission is composed of five members and is supported by a full-time staff, with responsibility for budget analysis and preparation of recommendations to Commission members. Hospitals that are dissatisfied with their approved budgets may request an informal hearing with the Commission, request a mid-year amendment or petition for a formal hearing before a state hearing officer.

PB80-195555 PC **A04**/MF **A01**
Abt Associates, Inc., Cambridge, MA.
National Hospital Rate-Setting Study. Volume IX. Case Study of Prospective Reimbursement in Western Pennsylvania.
Interim rept.,
Michael Sumner, and Gary Gaumer. Nov 79, 63p 79-4(H), DHEW/PUB/HCFA-80-03037
Contract DHEW/HCFA-500-78-0036
See also Volume 8, PB80-195548. Report on Health Care Financing Grants and Contracts.
Also available in set of 9 reports PC E20, PB80-195464.

The prospective reimbursement program in western Pennsylvania has been administered by Blue Cross of Western Pennsylvania (BCWP) since the program started in 1971. The program is run with a staff of about fifteen. Analysts review budget proposals and negotiate specific items with hospitals. The voluntary nature of the program from 1974 to 1976 allowed hospitals to enter the program, receive a prospectively set operating budget, and then withdraw. After 1976, hospitals already in the program and those choosing to join were required to remain under prospective reimbursement through June of 1979. For fiscal year 1979, twenty-three of approximately ninety hospitals in the area served by BCWP participated in the program.

PB80-199300 PC **A04**/MF **A01**
Rhode Island Dept. of Health, Providence.
Planning for Delivery of Occupational Health Services under Public Law 93-641 in Rhode Island. Volume III: HMOs (Health Maintenance Organizations) and the Delivery of Community Based Occupational Health Services: The Rhode Island Group Health Association Occupational Health Feasibility Study,
Gail E. Costa. Apr 80, 65p
Contract PHS-NIOSH-210-78-0121
See also Volume 2, PB80-199318.

The delivery of comprehensive occupational health services by health maintenance organizations (HMOs) is proposed as a promising means of meeting the needs of the many workers and employers of small and medium size firms. This proposition is analyzed from two perspectives. The many benefits from a public policy perspective are outlined, followed by the presentation of the results of a feasibility study of a particular HMO, Rhode Island Group Health Association, developing and offering such a program. Important public benefits identified include the potential of HMOs for reaching large numbers of workers and the possibility of removing the artificial and obstructive barrier between personal and occupational health care. The feasibility of Rhode Island Group Health Association developing an occupational health program was supported by the analysis.

PB80-199318 PC **A13**/MF **A01**
Rhode Island Dept. of Health, Providence.
Planning for Delivery of Occupational Health Services under Public Law 93-641 in Rhode Island. Volume II: The Occupational Mortality Study, Rhode Island 1968-1972,
David M. Gute. Apr 80, 298p
Contract PHS-NIOSH-210-78-0121
See also Volume 3, PB80-199300.

The document reports on the occupational, industrial, and mortality experience of approximately 43,000 white Rhode Island resident decedents during the years 1968-1972. These data are analyzed by the calculation of standardized mortality ratios by occupation, industry, sex, and cause of death for the age intervals: 16-34, 35-44, 45-54, and 55-64. Proportionate mortality ratios are calculated for identical age intervals and also for ages 65-74, 75-84, and 85. Statistically significant ratios are commented on and compared with data from similar occupational and industrial mortality reports. Such analyses are viewed as valuable contributions in the development of hypotheses concerning the relationships between work and health. This report also concludes that a consideration of occupational mortality can be a useful perspective with which to effectively allocate occupational safety and health resources in Rhode Island.

PB80-812720 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Telecommunication in Medicine. 1964-June, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Jun 80,
Elizabeth A. Harrison. Jul 80, 160p
Supersedes NTIS/PS-79/0786 and NTIS/PS-78/0751.

Research reports cover teleconsultation, communications for emergency medical services, medical communication networks and television systems, and telecommunications for medical information systems and rural health services. (This updated bibliography contains 152 citations, 9 of which are new entries to the previous edition.)

PB80-929410 PC$5.25/MF$3.00
National Cancer Inst., Bethesda, MD. International Cancer Research Data Bank.
Oral and Head and Neck Cancer.
Special listing.
3 Jul 80, 70p NCI/ICRDB/SL-336
Supersedes NTISUB/E/294-014.

The Special Listing of Current Cancer Research Projects is a publication of the International Cancer Research Data Bank (ICRDB) Program of the National Cancer Institute. Each Listing contains descriptions of ongoing projects in one selected cancer research area. The research areas include: Diagnostic and prognostic studies of oral and head and neck cancers; Treatment of oral and head and neck cancers; Rehabilitation and other support following treatment of oral and head and neck cancers; Etiology, epidemiology, and follow-up studies of patients with oral and head and neck cancers; Training programs for dental professions; Broad clinical programs for treatment of head and neck cancers; Salivary gland pathology.

6F. Environmental Biology

AD-A085 551/0 PC **A02**/MF **A01**
Army Medical Bioengineering Research and Development Lab Fort Detrick MD
Field Test of Bacillus thuringiensis var. israelensis Against Psorophora columbiae Larvae in Small Rice Plots.
Final rept.,
Stephen C. Hembree, Max V. Meisch, and Dwight Williams. 1979, 5p
Pub. in Mosquito News, v40 n1 p67-70 Mar 80.

No abstract available.

AD-A085 552/8 PC **A02**/MF **A01**
Institute for Medical Research Kuala Lumpur (Malaysia)
The Efficacy of Dimethoate as a Systemic Acaricide foe the Control of Chiggers (Acarina: Trombiculidae),
A. L. Dohany, D. L. Huxsoll, J. P. Saunders, and O. W. Phang. 1979, 6p
Grant DAMD17-78-G-9440
Pub. in Jnl . of Medical Entomology, v17 n1 p30-34, 31 Jan 80.

No abstract available.

AD-A085 555/1 PC **A02**/MF **A01**
Army Medical Bioengineering Research and Development Lab Fort Detrick MD
Preliminary Report of Some Mosquito Pathogens from Thailand,
Stephen C. Hembree. 1979, 9p
Pub. in Mosquito News, v39 n3 p575-582 Sep 79.

No abstract available.

AD-A085 802/7 PC **A03**/MF **A01**
Florida Atlantic Univ Boca Raton Dept of Biological Sciences
Ecological Evaluation of a Beach Nourishment Project at Hallandale (Broward County) Florida. Volume II. Evaluation of Benthic Communities Adjacent to a Restored Beach, Hallandale (Broward County), Florida.
Miscellaneous rept.,
G. Alex Marsh, Philip R. Bowen, Donald R. Deis, David B. Turbeville, and Walter R. Courtenay, Jr. Mar 80, 35p CERC-MR-80-1-VOL-2
Contract DACW72-77-M-0639
See also Volume 1, AD-A083 595.

Benthic communities adjacent to a restored beach at Hallandale (Broward County), Florida were analyzed and compared to similar communities at nearby Golden Beach (Dade County). Five sand stations and four reef stations were sampled at each locality along a transect from the intertidal zone through the second reef. This study assesses the postnourishment condition of sandy-bottom and reef-dwelling communities approximately 7 years after beach nourishment and offshore dredging. The study also provides prenourishment data for an impact analysis of a fill project underway at Hallandale in September 1979. Core samples at sand stations yielded 114 invertebrate species, not including nemerteans and oligochaete annelids. More than 90 percent of the fauna occurred at the two outer stations in densities of up to 17,144 individuals per square meter. Quadrat samples of reef biota showed a maximum abundance and diversity of corals, alcyonarians, and sponges in the middle and outer regions of the second reef. The reefs appeared in good condition, and showed no apparent effects from a 1971 beach nourishment project. (Author)

EPRI-FP-1252 PC **A04**/MF **A01**
New York State Energy Research and Development Authority, Albany.
Coal Waste Artificial Reef Program. Phase I.
P. M. J. Woodhead, I. W. Duedall, and N. F. Lansing. Nov 79, 74p

The overall objective of the Coal Waste Artificial Reef Program is to explore the feasibility of a method for ocean disposal of fly ash and scrubber sludge from coal-fired power plants. The program is to construct an artificial reef in the Atlantic Ocean near Long Island from stabilized blocks of these waste materials. The reef is expected to enhance biological productivity and to provide a location for sport fishing analogous to that enjoyed at the Fire Island artificial reef. The concept is based on investigations conducted by the Marine Sciences Research Center of SUNY, Stony Brook, into the effects of commercially-produced stabilized mixes of fly ash and sludge on the marine environment. The test blocks employ mixes selected on the basis of this prior work. The emphasis has been on measuring the specific effects associated with the particular mixes to be used for the reef. Block development has been pursued to define a process for production of the large blocks planned for the reef. The physical properties of the blocks have been investigated to assess their long term stability. The chemical properties have been evaluated to provide a background for assessment of the probable environmental effect of the blocks in the ocean. An environmental baseline description has been initiated to provide a reference for long-term impacts of the reef. Biological tests have been performed to assess the effects of the reef materials on marine life. The results have been favorable. Large blocks can be produced with sufficient strength and stability to survive in the ocean. No adverse biological effects have been found from the presence of the smaller test blocks at the reef site or from leachates which might result from their presence. (ERA citation 05:018348)

INIS-mf-4727 MF **A01**
Oslo Univ. (Norway). Inst. for Kjemi.
Investigations on Radiactive Fallout in Man and Foodstuffs in Norway. Annual Report.
G. C. Christensen, L. Loevby, and A. C. Pappas. Mar 75, 45p
In Norwegian.
U.S. Sales Only. Microfiche copies only.

Tables are presented giving the Sr 90 content in human bone from 190 subjects who died in 1973 and 1974. These are summarised in age groups and presented with corresponding figures for the years from 1956 onwards. The activity per gram of calcium for infants from 6 months to 2 years is compared with the activity in milk for each year from 1956. This information is also presented on histograms. The content of Sr 90 and Cs137 in cheese samples from a number of dairies spread over the whole country is also given and summarised by district for each year from 1959. The Sr 90 content in carrots, cabbage, turnips, potatoes and beetroot are given for samples from a number of districts and summarised for each vegetable and year from 1959. The Sr 90 content in wheat and barley from granaries in several districts are given and compared with wheat samples from Sweden. (Atomindex citation 11:499626)

INIS-mf-4728 PC **A03**/MF **A01**
Oslo Univ. (Norway). Inst. for Kjemi.
Investigations on Radioactive Fallout in Man and Foodstuffs in Norway. Annual Report.
G. C. Christensen, J. Hellesnes, L. Loevby, and A. C. Pappas. Mar 76, 45p
In Norwegian.
U.S. Sales Only.

Tables are presented giving the Sr 90 content in human bone from 170 subjects who died in 1974 and 1975. These are summarised age groups and presented with correponding figures for the years from 1956 onwards. The activity per gram of calcium for infants from 6 monts to 2years is compared with the activity in milk for each year from 1956. This information is also presented on histograms. The content of Sr 90 and Cs 137 in cheese samples from a number of dairies spread over the whole country is also given and summarised by district for each year from 1959. The Sr 90 content in carrots, cabbage, turnips, potatoes and beetroot are given for samples from a number of districts and summarised for each vegetable and year from 1959. The Sr 90 content in wheat and barley from granaries in several districts are given and compared with wheat samples from Sweden. (Atomindex citation 11:499627)

INIS-mf-4729 MF **A01**
Oslo Univ. (Norway). Inst. for Kjemi.
Investigations on Radioactive Fallout in Man and Foodstuffs in Norway. Annual Report.
S. O. Gjelsnes, J. Hellesnes, L. Loevby, and A. C. Pappas. Mar 77, 30p
In Norwegian.
U.S. Sales Only. Microfiche copies only.

Tables are presented giving the Sr 90 content in human bone from 212 subjects who died in 1975 and 1976. These are summarised in age groups and presented with corresponding figures for the years from 1956 on wards. The activity per gram of calcium for infants from 6 months to 2years is compared with the activity in milk for each year from 1956. This information is also presented on histograms. The content of Sr 90 and Cs 137 in cheese samples from a number of dairies spread over the whole country is also given and summarised by district for each year from 1959. The Sr 90 content in wheat and barley from granaries in several districts are given and compared with wheat samples from Sweden. (Atomindex citation 11:499634)

LBL-10527 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Impact of Reduced Ventilation on Indoor Air Quality in Residential Buildings.
J. V. Berk, C. D. Hollowell, J. H. Pepper, and R. A. Young. Mar 80, 21p EEB-Vent-80-5, CONF-800608-2
Contract W-7405-ENG-48
Air Pollution Control Association annual meeting, Montreal, Canada, Jun 1980.

Rising energy prices have generated a national incentive to reduce ventilation rates in buildings and thereby lower heating and cooling costs. One of the ramifications of reducing ventilation is that indoor air contaminants build up and pose a health risk to occupants. A research program being conducted to determine the extent to which low ventilation rates are compatible with good indoor air quality is described. Overall indoor air quality is influenced by air-exchange rates, types of appliances and building materials used, and occupant activities. From the numerous indoor air pollutants studied, four (carbon monoxide and nitrogen dioxide from gas appliances; formaldehyde from particle-board, plywood, urea formaldehyde foam insulation, and gas appliances; and radon from soil, building materials, and ground water) are receiving considerable attention in the context of potential health risks associated with energy conservation. Field monitoring studies in energy-efficient residential buildings have demonstrated that, in some cases, these indoor-generated pollutants exceed outdoor air-quality standards in houses having air-exchange rates of less than 0.5 air changes per hour. The results of our research suggest that further studies, designed to include a broader range of infiltration rates ad occupancy conditions, are needed before establishing energy-efficient infiltration standards for residential buildings. (ERA citation 05:020790)

NUREG/CR-1100 PC **A07**/MF **A01**
Oak Ridge National Lab., TN.

Evaluation of Impingement Losses of White Perch at the Indian Point Nuclear Station and Other Hudson River Power Plants,
W. Van Winkle, L. W. Barnthouse, B. L. Kirk, and D. S. Vaughan. Jun 80, 146p ORNL/NUREG/TM-361
Contract W-7405-eng-26
Pub. as Environmental Sciences Div. PUB-1480.

This report evaluates two independent lines of evidence concerning impingement losses of white perch at the power plants on the Hudson River. Based on regression analyses of impingement rate as an index of year-class strength versus year over the period 1972 through 1977, it is concluded that there is little evidence of a statistically significant downward trend. However, an analysis of minimum detectable differences in impingement rates indicates that a long time series of year-class strength would be required to detect even substantial reductions (e.g., 50%). Second, based on our estimates of percent reduction in year-class strength due to impingement (>20% for the 1974 year class and >15% for the 1975 year class), it is concluded that the level of impingement impact is not acceptable a priori from the point of view of managing the white perch population.

PB80-194020 PC **A05**/MF **A01**
Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.
A Digitized Systematic Classification for Ecosystems with an Illustrated Summary of the Natural Vegetation of North America.
Forest Service general technical rept. (Final),
David E. Brown, Charles H. Lowe, and Charles P. Pase. Jun 80, 99p FSGTR/RM-73

An increasing need for careful husbandry of the earth's natural resources has renewed interest in the classification and mapping of ecosystems. The inventory of our remaining biotic entities is particularly urgent because the increased aspirations of a constantly growing world population are placing ever greater stress on these generous, but finite, living resources.

PB80-196132 PC **A02**
Mississippi State Univ., Mississippi State. Dept. of Biological Sciences.
Production and Transport of Detritus in Wetlands,
Armando A. de la Cruz. Nov 78, 16p NOAA-80051206
Grant NOAA-04-8-M01-92
Pub. in Proceedings of National Symposium, 'Wetland Functions and Values: The State of Our Understanding,' American Water Resources Association, p162-174 Nov 78. Prepared in cooperation with Mississippi-Alabama Sea Grant Consortium No. MASGC-78-039.

Decomposition has been studied in some 30 species of fresh water and 11 species of estuarine wetland plants. Decomposition rates determined by the litter bag technique vary among fresh water species from 60 to 80% breakdown of material over a 90-day period and from 40 to 100% for a one-year period. Among estuarine and marine plants, decomposition rates vary from 35 to 96%. These rates represent only the fragmentation of dead plants confined in litter bags to detrital particles 1-10 mm in diameter, under a particular set of environmental conditions. Decomposition beyond the particulate form has been studied only in the smooth cordgrass, Spartina alterniflora, and the black needle rush, Juncus roemerianus, which showed decay rates of 30-90% in 30 days.

RFP-3052 PC **A02**/MF **A01**
Atomics International Div., Golden, CO. Rocky Flats Plant.
Plutonium/Americium Inventory of a Pond Ecosystem Near the Rocky Flats Facility.
J. D. Hurley, and T. F. Winsor. 1980, 6p CONF-800607-10
Contract EY-76-C-04-3533
American Nuclear Society annual meeting, Las Vegas, NV, USA, 8 Jun 1980.

The data indicate that concentrations of exp 239 Pu exceed fallout background levels in soil and sediment. However, the levels in soil and vegetation indicate subtantial dilution at this location downwind from a previously studied area near the source. Radioecological data for exp 241 Am reported herein are the first at Rocky Flats. The measurement accuracy however, for exp 241 Am and exp 238 Pu is not yet well established at such low levels. Calculated inventories reveal that the greatest quantities of the three radioisotopes reside in soil and sediment. This information verifies the pattern of previously obtained data on radionuclide distributions at Rocky Flats in terrestrial and aquatic environments, but at concentration levels lower by one or more orders of magnitude. In the latter sense, the present data are unique and useful. (ERA citation 05:021188)

6G. Escape, Rescue, and Survival

PB80-812837 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Search and Rescue Methods and Equipment. 1964-June, 1980 (A Bibliography with Abstracts).
Rept. for 1964-Jun 80,
Edith Kenton. Jul 80, 269p
Supersedes NTIS/PS-79/0649 and NTIS/PS-78/0539.

Reports dealing with maritime and aviation search and rescue are presented. Studies are included on search and rescue planning, locating equipment, rescue beacons, communication devices, specialized aircraft and their components, and searching strategies. Underwater rescue and survival are excluded. (This updated bibliography contains 262 abstracts, 30 of which are new entries to the previous edition.)

6H. Food

INIS-mf-5393 PC **A04**/MF **A01**
Atomic Energy Board, Pelindaba, Pretoria (South Africa).
National Symposium on Food Irradiation.
Oct 79, 63p CONF-7910135-(Absts.)
National symposium on food irradiation, Pretoria, South Africa, 3 Oct 1979.
U.S. Sales Only.

This report contains abstracts of papers delivered at the National symposium on food irradiation held in Pretoria. The abstracts have been grouped into the following sections: General background, meat, agricultural products, marketing and radiation facilities - cost and plant design. Each abstract has been submutted separately to INIS. Tables listing irradiated food products cleared for human consumption in different countries are given as well as a table listing those irradiated food items that have been cleared in South Africa. (Atomindex citation 11:499699)

PATENT-4 201 709 Not available NTIS
Department of Agriculture, Washington, DC.
Process for Producing a Low Gossypol Protein Product from Glanded Cottonseed.
Patent,
Ranjit S. Kadan, Donald W. Freeman, James J. Spadaro, and George M. Ziegler, Jr. Filed 26 May 78, patented 6 May 80, 7p PB80-190432, PAT-APPL-910 153
Supersedes PB-290 543.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A low-gossypol, high-protein flour is produced by a process which uses conventional solvent extraction equipment with a certain series of steps, culminating at a point where a defatted, milled, cottonseed flour mixture is rendered edible for human consumption by the separation of the gossypol-containing portion.

PATENT-4 205 133 Not available NTIS
Department of Agriculture, Washington, DC.
Apparatus for Fermenting Liquids.
Patent,
Emil Wick. Filed 26 Apr 78, patented 27 May 80, 7p PB80-192271, PAT-APPL-900 371
Supersedes PB-282 776.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An apparatus for fermenting liquids is composed of a rear member angularly disposed to the horizontal, two vertical side members attached to the rear member, and a front member angularly disposed to the horizontal attached to the vertical side members and the rear member at its base. The primary advantage of the method and apparatus of the invention is that very rapid fermentation may be accomplished continuously in small fermentors. For example, in the production of wine, the limiting factor is the rate of reaction between yeast and sugar in the juice. Thus, wine can be prepared in accordance with the invention in a matter of hours whereas conventional fermenting techniques require three to four days.

PB80-190192 CP **T99**
Science and Education Administration, Hyattsville, MD. Consumer Food Economics Inst.
Data Sets Pertaining to Agriculture Information Bulletin No. 382.
Data file,
Jennie B. Nichols, Brucy C. Gray, and Cynthia C. Junker. 15 May 80, mag tape USDA/DF-80/003
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products for price. Price includes documentation, PB80-190200.

This file contains composition values from a slightly revised version of Table 1 of Agriculture Information Bulletin No. 382, 'Nutrition Labeling--Tools for Its Use', issued in 1975. Twelve composition values for common household measure of 885 foods are included. Composition values in file 382-1 are for food energy, protein, carbohydrate, fat, and percentages of the U.S. RDA for protein, vitamin A, vitamin C, thiamin, riboflavin, niacin, calcium, and iron. The values have been rounded according to the rules used for food labeling. The data set contains a 5-digit food code and an abbreviated description for each food item. Files 382-2 and 382-3 are companion files to 382-1 and contain the same 5-digit code and abbreviated description for each food item. File 382-2 has the composition values rounded to the nearest whole calorie and to the nearest gram of protein, carbohydrate, and fat. The percentages of the U.S. RDA have been rounded to the nearest hundredth of a percent.

PB80-190200 PC **A08**/MF **A01**
Science and Education Administration, Hyattsville, MD. Consumer Food Economics Inst.
Nutrition Labeling - Tools for Its Use.
Mar 79, 155p CFE(ADM)-347, CFE(ADM)-348, USDA/DF-80/003A
Includes rept. no. CFE(ADM)-349, CFE(ADM)-350, and CFE(ADM)-351. For system on magnetic tape, see PB80-190192.

This document gives the nutritive value of selected foods used in Nutrition Labeling. It also gives the percentage of the U.S. Recommended Dietary Allowance for selected nutrients. CFE 347-349. Booklet CFE 350 contains a listing and complete description of foods for which composition values are presented in Data Sets 382-1, 382-2, and 382-3. CFE contains the formats for data sets 382-1, 282-2, and 382-3.

PB80-190218 CP **T99**
Science and Education Administration, Hyattsville, MD. Consumer Food Economics Inst.
Data Set Spring Basic Individual 1977 Nationwide Food Consumption Survey.
Data file,
Eleanor Pao, and Brucy Gray. 15 May 80, mag tape USDA/DF-80/004
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products for price. Price includes documentation, PB80-190226.

This file contains food and nutrient intake for 9,260 men, women, and children plus 40 breast-fed in-

fants (weighted on household basis) collected in spring, 1977, as part of Nationwide Food Consumption Survey 1977-78. The interview was conducted in the home with each individual asked to recall his previous day's diet and then to keep a diet record for the next 2 days which the interviewer returned to review and pick up after completion. Information was gathered on all days of the week including Saturday and Sunday. Data includes for each eating occasion, its name, time, and person(s) sharing it, and if eaten away from home, where eaten, type of service, and cost. For each food and beverage, the kind and quantity (grams) is given and whether from home supplies or obtained away. Data given on vitamin and mineral supplements taken, frequency of consuming organ meats during previous 30 days, whether person is a vegetarian and if so, type of foods eaten, whether person is on a diet, whether diet was typical, and self-appraisal of health status. Characteristics available for each individual are sex, age, race, if Spanish descent; estimated height and weight; pregnancy and lactation status for women; household income before taxes (category): household size; and education, occupation, and employment status of male and female heads. Nutrient content of each food, each day's intake, and 2 or 3 day average intake are available for energy, protein, fat, carbohydrate, calcium, iron, magnesium, phosphorus, vitamin A value, thiamin, riboflavin, preformed niacin and vitamins B6, B12, and C.

PB80-190226 PC **A25**/MF **A01**
Science and Education Administration, Hyattsville, MD. Consumer Food Economics Inst.
Coding Manual to Handle Data from Nationwide Survey of Individuals, Spring 1977-78.
Final rept.
1 Nov 79, 598p CFE(ADM)-352, USDA/DF-80/004A
For system on magnetic tape, see PB80-190218.

This document gives the food codes that were used in the Nationwide Survey of Individuals, Spring 1977-78. Along with the code is a complete description of the food item and the gram weight equivalent of several household measures for each food item. The manual is arranged with the codes in ascending order. The codes contain seven numeric characters.

PB80-193113 PC **A14**/MF **A01**
Cooperative State Research Service, Washington, DC.
Physico-Chemical Basis of Grain Milling,
Ya. N. Kuprits. 1980, 318p TT-77-53388
Trans. of mono. Fiziko-Khimicheskie Osnovy Razmola Zerna, Moscow, 1946. Sponsored in part by National Science Foundation, Washington, DC. Special Foreign Currency Science Information Program.

Technological processes of grain milling are still regarded by many investigators as the problems of only mechanical technology involving the laws of mechanics and study of the strength of materials. The experimental material of the author's grain studies due to similar investigations in the connected areas, has enabled him, to draw some generalized inferences, making it possible to approach closer to the theory of grain milling processes and to identify the physico-chemical principles of these processes. The present monograph cannot, of course, pretend to complete the interpretation of the grain milling problems. The obtained results provide the basis for putting forward a number of new concepts, which are being presented. This monograph is the first attempt towards the complex investigation of the grain milling processes.

PB80-195951 PC **A11**/MF **A01**
Kasetsart Univ., Bangkok (Thailand). Inst. of Food Research and Product Development.
Selected Papers on Protein Food Promotion. Volume I: Nutrition and Protein. Strategies to Improve the Diet of the Poor,
G. D. Kapsiotis, G. F. Combs, and F. W. Hill.
1970, 247p
See also Volume 2, PB80-195969. Papers presented at a seminar held at Kasetsart Univ., Bangkok (Thailand) on November 22-December 1, 1970. Sponsored in part by Agency for International Development, Washington, DC.

The broader issues of nutrition research, combatting malnutrition, the effect of income on nutrition, and the role of government in nutritional efforts are presented in this volume of nineteen papers. The papers were presented at a seminar November 22-December 1, 1970 at Kasetsart University in Thailand.

PB80-195969 PC **A11**/MF **A01**
Kasetsart Univ., Bangkok (Thailand). Inst. of Food Research and Product Development.
Selected Papers on Protein Food Promotion. Volume II: Food Processing and Protein Fortification,
F. E. Horan, Hans-Dieter Payer, and Vichitr Benjasil. 1970, 241p
See also Volume 1, PB80-195951. Papers presented at a seminar held at Kasetsart Univ., Bangkok (Thailand) on November 22-December 1, 1970. Sponsored in part by Agency for International Development, Washington, DC.

The volume contains fourteen papers presented at a seminar November 22-December 1, 1970 at Kasetsart University in Thailand. The papers address the issues of nutrition research, combating malnutrition, the effect of income on nutrition, and the role of government in nutritional efforts.

PB80-812852 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Food Packaging and Storage. June, 1977-June, 1980 (A Bibliography with Abstracts).
Rept. for Jun 77-Jun 80,
Edith Kenton. Jul 80, 111p
Supersedes NTIS/PS-79/0695 and NTIS/PS-78/0482. See also 1970-May, 1977, NTIS/PS-78/0481.

The bibliography cites many diverse references on the subject. It includes studies on the biochemical aspects of plastic, paper, and paperboard packaging materials. Irradiation research for different foods to extend their shelf life is discussed as well as handling and storing problems of fresh fish and seafood through processing. The bibliography contains references on the health and safety guidelines for the meat packing industry, operational aspects and statistics of the packaging materials industry, and the beef cutting and packing industry. (This updated bibliography contains 104 abstracts, 51 of which are new entries to the previous edition.)

6J. Industrial (Occupational) Medicine

PB80-188014 CP **T02**
Bureau of Labor Statistics, Washington, DC. Office of Occupational Safety and Health Statistics.
Supplementary Data System, Microdata File, Vermont, 1979.
Data file,
Norman Root, and Chris Kirsch. 1979, mag tape BLS/DF-80/022
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB80-149982.

Tape contains records of individual occupational injuries and illnesses. Selected injury and illness factors were classified in accordance with standard definitions used in the Supplementary Data System of the Bureau of Labor Statistics. Each case record contains year, month and day of occurrence; nature of injury or illness, part of body affected, type of accident or exposure, and source of injury or illness; and occupation, industry, age, and sex. Technical documentation is available: PB80-149982, Supplementary Data System, Microdata Files, User's Guide, 1978-79.

PB80-188022 CP **T02**
Bureau of Labor Statistics, Washington, DC. Office of Occupational Safety and Health Statistics.
Supplementary Data System, Microdata File, Alaska, 1978.
Data file,
Norman Root, and Chris Kirsch. 1978, mag tape BLS/DF-80/020
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB80-149982.

Tape contains records of individual occupational injuries and illnesses. Selected injury and illness factors were classified in accordance with standard definitions used in the Supplementary Data System of the Bureau of Labor Statistics. Each case record contains year, month and day of occurrence; time of accident and time workday began; nature of injury or illness, part of body affected, type of accident or exposure, and source of injury or illness; and occupation, industry, age, sex, length of service, and weekly wages of injured or ill employee. Technical documentation is available: PB80-149982, Supplementary Data System, Microdata Files, User's Guide, 1978-79.

PB80-188600 CP **T02**
Bureau of Labor Statistics, Washington, DC. Office of Occupational Safety and Health Statistics.
Supplementary Data System, Microdata File, Virgin Islands, 1978.
Data file,
Norman Root, and Chris Kirsch. 1978, mag tape BLS/DF-80/021
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB80-149982.

Data was compiled by the Virgin Islands Department of Labor from records of workers' compensation cases that were received during 1978 and involved one or more lost workdays and/or medical treatment. Data include cases arising in public employments, and in private employments with the exception of domestic servants, religious and/or charitable organizations, and casual employees in a private home. In addition, Federal, railroad and maritime employments are not covered by the State act and cases involving such employees are not included in these data.

PB80-192016 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 79-86-675, Tufts Medical School, Boston, Massachusetts.
Mar 80, 9p NIOSH-HE-79-86-675

On the basis of the data obtained in this investigation, NIOSH has determined that the cluster of five cases with symptoms of angioneurotic edema was probably not caused by chemical exposure at Tufts Medical School. However, certain chemicals in the work environment, such as formaldehyde, may have precipitated an allergic reaction to employees with allergic histories. It is recommended that the employee with nonhereditary angioneurotic edema prudently minimize exposure to any chemical sensitizing agents such as formaldehyde that could trigger episodes of angioneurotic edema. Recommendations to improve health and safety in the work environment are included in the report.

PB80-192024 PC **A02**/MF **A01**
Johns Hopkins Univ., Baltimore, MD.
Walk-Through Survey Report, Contract 210-77-0096, T. F. Nugent Incorporated, Rockefeller Plaza, New York, New York,
Genevieve M. Matanoski, Don Schott, and Mark Young. 1 Apr 80, 8p
Contract PHS-NIOSH-210-77-0096

Even though exposure to the painters is probably low, painting operations in Rockefeller Plaza may be considered for in-depth sampling because it would be difficult to find a better maintenance painting operation. The paint mixers are probably experiencing the highest solvent exposure and would be the most interesting part of any sampling study. The question which needs answering is whether or not one painting operation of each type should be included in the sampling portion of the

overall study. If yes, Rockefeller Plaza maintenance painting operations would probably be the best available because of the large number of strictly maintenance painters, only 20 percent latex paints are used, and painting operations seem quite consistent the year round.

PB80-192032 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. 79-30-669, CF and I Steel Corporation, Pueblo, Colorado.
Feb 80, 20p NIOSH-HE-79-30-669

On the basis of these environmental and medical data, NIOSH concluded that a health hazard existed from overexposure to lead and crystalline silica at CF and I Steel Corporation. Recommendations on ventilation, work practices, and medical surveillance procedures necessary to control these hazards are included.

PB80-192040 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 79-143-671, Shorewood Packaging Corporation, Farmingdale, New York.
Mar 80, 8p NIOSH-HE-79-143-671

On the basis of the data obtained in this investigation, NIOSH determined that a hazard of exposure to photoxic chemicals existed at the Shorewood Packaging Corporation. Worker exposure to these chemicals had caused photosensitive reactions (burning, swelling, erythema, and dermatitis) to the skin, particularly to the hands and arms. Detector tube air samples did not detect any ozone gas in the workers breathing zone. As observed on a follow-up visit to this plant (November 21, 1979), improved work practices, hygienic measures, and medical treatment appear to have brought these problems under control. To assist in the control of this hazard, NIOSH recommendations are listed in the last section of this report.

PB80-192057 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Hazard Evaluation and Technical Assistance Report TA 79-45, Internal Revenue Service, Erlanger, Kentucky.
Feb 80, 8p NIOSH-HE/TA-79-45

On the basis of the data obtained in this investigation, NIOSH determined that employees were not being exposed to hazardous concentration by carbon monoxide, asbestos, or fibrous glass at the Internal Revenue Service in Erlanger, Kentucky. However, an interesting finding of this study was that the carboxyhemoglobin levels of smokers in the office exceeded the recommended standard due to smoking alone, and that while the nonsmokers' levels were below the recommended standard, they did increase during the 8-hour workshift, indicating that smoking in the office affected all workers, smokers, and nonsmokers alike.

PB80-192065 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Technical Assistance Report TA 79-25, Detroit Canada Tunnel, Detroit, Michigan.
Feb 80, 12p NIOSH-HE/TA-79-25

Based on the information collected during the time of this evaluation no health hazard existed to inspectors under the current methods of operation. Results do indicate that although carbon monoxide exposures were not in excess of recommended levels, an increase in COHb levels occurred during the shifts. Even though these increases were not excessive, the practice of rotating inspectors should be continued so as not to unduly expose these individuals.

PB80-192073 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 79-132-673, Lance Corporation, Hudson, Massachusetts.
Mar 80, 19p NIOSH-HE-79-132-673

On the basis of the data obtained in this investigation, NIOSH determined that in the finishing (cleanup) and buffing areas a hazard of exposure to lead existed at the time of the survey with a potential hazard in the tool-room. No hazard at the time of the survey to lead existed in the pewter casting, dipping, or soldering areas; also no health hazard to any organic materials or nuisance particulates existed in any areas. Workplace observations indicate that the exposures to lead were due to a combination of inhalation and possibly ingestion. Recommendations on improvement to local exhaust ventilation and personal hygiene were developed by NIOSH and are incorporated in detail in the main body of this report.

PB80-192081 PC **A03/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 78-137-676, Hi-G Incorporated, Windsor Locks, Connecticut.
Mar 80, 29p NIOSH-HE-78-137-676

On the basis of the data obtained in this investigation, NIOSH determined that an environmental health hazard did not exist from any of the chemicals evaluated. However, it was concluded that after the initial outbreak of illness, employees had a heightened awareness of various environment conditions, and that subsequent minor environmental changes may have precipitated outbreaks of illness.

PB80-192099 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. HE 79-146-670, Cincinnati College of Mortuary Science, Embalming Laboratory, Cincinnati, Ohio.
Mar 80, 15p NIOSH-HE-79-146-670

On the basis of the data obtained in this investigation, NIOSH has determined that a hazard from overexposure to embalming chemicals, including formaldehyde, at the Cincinnati College of Mortuary Science, did exist during the time the exhaust system was not operating at full potential. Accordingly, recommendations along with a discussion of the ventilation system have been incorporated into the report as a guide for the control of potential or increased exposures that result from embalming operations.

PB80-192107 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. 79-144-672, Quoizel, Inc., Hauppauge, New York.
Mar 80, 14p NIOSH-HE-79-144-672

A health hazard evaluation of the Tiffany lamp assembly area at the Quoizel Company was conducted on October 19, 1979, and November 22, 1979. The employees at the company, were not exposed to potentially toxic concentrations of lead, zinc, and hydrogen chloride fumes. However, because of the occurring symptomatology and observed fume conditions, it is recommended that local exhaust ventilation be installed for the assembly operators. Also because of uncertain risks of asbestos-induced cancers and asbestosis it is recommended that the work-table surface be replaced with a non-asbestos material of similar thermal characteristics.

PB80-192115 PC **A02/MF A01**
Johns Hopkins Univ., Baltimore, MD.
Walk-Through Survey Report, Contract 210-77-0096, General Motors Assembly Division, Fairfax Plant, 100 Kindelberger Road, Kansas City, Kansas 66115,
Genevieve M. Matanoski, Don Schott, and Mark Young. 1 Apr 80, 14p
Contract PHS-NIOSH-210-77-0096

The plant is not ideal for an industrial hygiene survey even though huge quantities of paint are used, painters do not use respirators, and the process is continuous. The workers in the spray booths are well spaced and automatic paint spray application equipment keeps employee exposure to overspray to a minimum. The booths seem to eliminate potential for exposure to paint. The stability of this workforce makes the General Motors Plant an appropriate one for an epidemiological study of automotive OEM.

PB80-192636 PC **A09/MF A01**
Utah Biomedical Test Lab., Salt Lake City.
Occupational Illness and Injury Data in Agriculture.
Annual rept. no. 2,
John A. Burkart, Norman F. deGroot, and Lewis B. Wolfenson. Mar 76, 194p TR-201-003
Contract PHS-CDC-99-74-110

Workers compensation case records from 17 states and Puerto Rico and the Farm Accident Survey for 21 states were reviewed to assess safety and health problems in agriculture. The records were analyzed to identify predominant causes of injury and illness on a yearly basis. Data limitations of the workmen's compensation files included: incomplete geographical coverage, lack of case record detail, coding incompatibility, underreporting, and reporting errors. The most common cause of accidents was working surfaces, followed by vehicles, tools, and animals. The National Data Collection System was developed to provide an effective and efficient link between collected data and users' needs.

PB80-192933 PC **A04/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Industrial Hygiene Report In-Depth Survey of Monochlorobenzene and Methyl Chloride Exposure at the Dow Chemical Company, Midland, Michigan,
Michael S. Crandall, Charles S. McCammon, John Fajen, and Robert Phillips. Mar 80, 59p

In-depth industrial hygiene surveys were conducted simultaneously at the monochlorobenzene (MCB) and Styrofoam expanded polystyrene production units at the Dow Chemical plant in Midland, Michigan, in June 1979, to document exposures to MCB and methyl chloride respectively. Personal and area environmental samples were collected over four consecutive work shifts. This report describes the work place, job types, production processes, sampling procedures used, sampling results, and conclusions that can be drawn from the surveys.

PB80-193014 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Hazard Evaluation and Technical Assistance Report No. TA 79-52, Federal Office Building No. 6, Washington, DC,
B. A. Hollett. Nov 79, 18p NIOSH-HE/TA-79-52

Temperature and humidity, and carbon monoxide (630080), carbon dioxide (124389), and dust concentrations were measured, air handling systems were monitored and interviews were conducted with occupants and operating engineers of Federal Office Building number 6, Washington, D.C. The evaluation was requested by the Health, Education, and Welfare Office of Education, on behalf of an unspecified number of occupants to determine whether harmful airborne contaminants were present. Nuisance particulate concentrations were less than 0.5 milligrams per cubic meter (mg/cu m), carbon dioxide was present in only trace amounts, and carbon monoxide was undetectable. All were within the acceptable OSHA criteria of 10mg/cu m, 30,000 parts per million (ppm), and 200ppm, respectively. Several deficiencies were observed in the operation, maintenance, and equipment of the air handling system and the occupants reported numerous complaints of illness and discomfort. NIOSH determined that no hazardous chemical concentrations were present during the test period. They recommend that the air handling

system be improved, and that clinical reports of illness be periodically reviewed. The basement garage also should be monitored as a potential carbon monoxide source.

PB80-193022 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 79-38-624, Dover Molded Products, Inc., Dover, Ohio,
G. E. Burroughs. Oct 79, 11p NIOSH-HE-79-38-624

Personal and environmental sampling was conducted, visual observations were made, and employees were interviewed to investigate possible toxic exposures at Dover Molded Products, Incorporated, Dover, Ohio on March 21 and 22, 1979. An authorized representative of the approximately 80 affected employees requested the evaluation. Samples analyzed for lead (7439921), chromium (7440473), cadmium (7440439), 1,1,1-trichloroethane (71556), Freon 11 (75694), and Freon 12 (75718) were within OSHA criteria of 0.05 milligrams per cubic meter (mg/cu m), 0.5mg/cu m, 0.2mg/cu m, 350 parts per million (ppm), 1,000ppm, and 1,000ppm respectively. The authors conclude that 2 employees, the color blender and the hopper filler, were exposed to concentrations of heavy metals above the recommended maximum levels. Other employees periodically were exposed to irritant substances. NIOSH recommends that the use of colorants containing chromium and cadmium be phased out; respirators be supplied and worn by the color blender and the hopper filler as long as these metals are used; job rotation be arranged so that an individual is not working on vinyl plastic and silicone molds continuously; smoking, eating and drinking be prohibited in the manufacturing portion of the facility; and press hoppers be refilled only when the operator is not in attendance.

PB80-193030 PC **A03/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 78-134-630, Ozark Airlines, Peoria, Illinois,
P. Pryor, J. A. Lybarger, M. Colligan, and M. T. Donohue. Nov 79, 42p NIOSH-HE-78-134-630

Environmental, medical, and ergonomic evaluations were conducted at the Ozark Airlines central reservations office in Peoria, Illinois on September 27 and 28, 1978 and January 24 to 26, 1979 to identify the cause of an episode of mass illness of synergistic origin from August 14 to 18, 1978. An evaluation request came from an authorized representative of Lodge 2307 of the International Association of Machinists at the Greater Peoria Airport, which represented the approximately 325 affected employees of Ozark. The environmental and medical assessments revealed that concentrations of carbon monoxide (630080), carbon dioxide (124389), hydrocarbons and pyrethin (121299), were below OSHA standards of 50 parts per million, 9,000 milligrams per cubic meter (mg/cu m), 1,800 to 2,050mg/cu m, and 5mg/cu m, respectively. No health problems from mites were identified. The ergonomic assessment identified the following as the most probable precipitating factors during the episode: elevated temperature (80 to 85 degrees F) and relative humidity (67 to 70 percent, 2 days after the episode), ventilation system malfunction, noise levels ranging from 65 to 85 decibels relative to the A-weighted scale (dBA), crowding and cluttered working conditions, and illumination values that were well below the 75 to 100 footcandles recommended for this type of work. The authors recommend that the ventilation system and illumination be improved, background noise be reduced, work areas be rearranged, and insect controls and cleaning programs be improved.

PB80-193063 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 78-91-621, Dresser Industries, Inc., Bradford, Pennsylvania.
Oct 79, 19p NIOSH-HE-78-91-621

On October 24 to 26, 1978, and June 19 and 20, 1979, breathing zone and general area samples were collected to determine possible toxic exposures to benzene (71432), trichloroethylene (79016), methyl ethyl ketone (78933), naphthalene (91203), total particulate, and dioctyl phthalate (117840) at Dresser Industries, Inc., in Bradford, Pennsylvania. An authorized representative requested the evaluation on behalf of the approximately 50 affected employees. Battery operated vacuum pumps were used for sampling, and analysis was performed by gas chromatography. Two sets of samples indicated that main spray and coating operators were exposed to concentrations of total particulates (70 and 142, and 50 and 96 milligrams per cubic meter (mg/cu m), respectively) that exceeded the OSHA standard (15mg/cu m). All other environmental measurements were within OSHA limits. The investigators recommend strict control of benzene and trichloroethylene, yearly physical examinations, personal protective equipment and instruction on its proper use, and improved cleaning methods and maintenance.

PB80-193188 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Walk-Through Survey Report on RF Radiation Exposures from Heat Sealers at Wilson Jones Company, 6150 Touhy Avenue, Chicago, Illinois 60648,
Robert F. Herrick, William E. Murray, Jr., Betsy Egan-Baum, and Richard Kramkowski. 8 May 80, 18p

On June 26, 1979, NIOSH conducted a walk-through survey of the radiofrequency (RF) heat sealing area at the Wilson Jones Company, in Chicago, Illinois. The purpose of the survey was to identify a population of workers which could be used in a study to determine if any health effects are associated with occupational exposures to RF radiation. A potential cohort of workers was identified in the RF heat sealing area of the Binding Division. Electric fields produced by the RF heat sealers were measured to document exposure levels. The electric field strength levels exceeded 200 V/M (duty cycle corrected) on two of five heat sealers evaluated. Confounding exposures were assessed and appear not to be a factor. Personnel record systems were evaluated as to their suitability for use in a study of reproductive histories. The cohort identified could be used in the study of reproductive histories. The cohort identified could be used in the study if combined with similar cohorts from other plants. The Wilson Jones Company is being considered as a possible participant in the NIOSH study.

PB80-193196 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch,
Walk-Through Survey Report on RF Radiation Exposures from Heat Sealers at Holum and Sons, Inc., 740 Burr Oak Drive, Westmont, Illinois 60559,
Robert F. Herrick, Betsy Egan-Baum, and William F. Murray, Jr. May 80, 19p

On June 25, 1979, NIOSH conducted a walk-through survey of the RF heat sealing area at Holum and Sons, Inc., in Westmont, Illinois. The purpose of the study was to identify a population of workers which could be used in a study to determine if any health effects are associated with occupational exposures to radiofrequency radiation. Electric fields produced by the RF heat sealers were measured to document exposure levels. The electric field strength levels exceeded 200 V/M (duty cycle corrected) on two of the six heat sealers evaluated. Confounding exposures were assessed and appear not to be a factor. Personnel record systems were evaluated as to their suitability for use in a study of reproductive histories. It appears from the personnel records that an appropriate cohort of RF heat sealer workers and a corresponding control group cannot be identified, therefore, Holum and Sons, Inc., will not be included in the NIOSH study.

PB80-193345 PC **A05/MF A01**
PRC Systems Sciences Co., McLean, VA.
Occupational Injuries in the General Building and Heavy Construction Industries.
Research rept. (Final).
May 79, 98p PRC-R-2452
Contract PHS-NIOSH-210-77-0032

The study was conducted to identify significant hazards and recommend solutions to reduce the injury and severity rates in the General Building and Heavy Construction industries (SIC 15 and 16). The study involved preparation of a digest of Federal and State regulations pertinent to the study area as well as an evaluation of the magnitude of the relevant safety problems. Actual accident/injury case records were reviewed to identify causal factors and to determine extent of OSHA coverage. Findings of the overall study resulted in recommendations for new or revised regulations and/or standards promulgation in the following five categories: Education and Training; Protective Headgear (Hard Hats); Medical Screening; Scaffolding; and Safety Nets.

PB80-193360 PC **A05/MF A01**
IIT Research Inst., Chicago, IL.
Evaluation of a Commercial Vacuum System for the Removal of Asbestos.
Final rept. Oct-Dec 79,
R. W. Welker, D. F. Finn, J. D. Stockham, and R. P. Hancock. May 80, 84p EPA-600/2-80-088
Contract EPA-68-02-2617

The report gives results of a brief field study that included measurement of personal, area, and environmental asbestos exposures resulting from wet and dry asbestos removal using a commercial vacuum system. Personal and area (indoor) asbestos concentrations during dry removal were less than 1 fiber/cu cm, as measured by NIOSH P and CAM 239 when the vacuum system was used. Asbestos released to the environment from the vacuum system's three-stage exhaust filter was negligible. Asbestos was released from the operator's protective garments when he exited the work area to service the vacuum system. Sources of asbestos fiber release associated with vacuum system operation were identified; these occurred during operation, disassembly, and asbestos disposal. Following vacuum shutdown, liquid drained from the collection reservoir due to inadequate door seals. During vacuum hose disassembly, bulk losses of asbestos-containing materials occurred. During disposal, the exterior of the vacuum truck became contaminated as the reservoir was emptied. Additional dry removal testing is required.

PB80-193618 PC **A03/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Div. of Physical Sciences and Engineering.
Detailed Control Technology Survey of a Coke Oven Plant.
Survey rept.,
John W. Sheehy. Jul 79, 36p

This report describes the results of a coke oven control technology field survey at a fully integrated steel plant. The study's four major objectives were: (1) Evaluate coal shoveling practices by benchmen; (2) test a sampling approach for evaluating door emission controls; (3) evaluate filter air systems in the worker lunchroom and larry car cab; and (4) determine effect of meteorological conditions, such as wind speed and direction, on coke battery CTPV concentrations.

PB80-193790 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 78-130-634, Ivy Hill Communications, Inc., Community Drive, Great Neck, Long Island, New York,
C. L. Mosely. Nov 79, 19p NIOSH-HE-78-130-634

Personal and area air sampling for airborne contaminants, bulk sample analysis by gas chromatography, and personal interviews with selected employees were conducted at the Ivy Hill Communications, Inc. printing facility in Great Neck, New York on August 16 and 17, 1979. The evaluation request came from a representative of the Amalgamated Lithographers of America, Local Number

1, who expressed concern over the health effects to approximately 50 employees of a new ultraviolet cured coating material. Sampling indicated that employees were not exposed to concentrations exceeding OSHA standards for isopropyl alcohol (67630), ozone (10028156), and ammonia (7664417), on the days surveyed. Several employees reported adverse dermal effects after contact with an ultraviolet cured chemical but subsequent modification of handling and engineering control reduced this hazard. Although excessive exposure to aromatic and nonaromatic solvents could not be evaluated objectively, the investigators concluded that two workers were exposed to excessive amounts of airborne solvents. The high aromatic content of some solvents may pose long term health effects, and NIOSH recommends that employee exposure be minimized through engineering control and work practice modification.

PB80-193808 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 78-48-622, White Motor Company, Exton, Pennsylvania,
R. J. Costello. Oct 79, 22p NIOSH-HE-78-48-622

Environmental sampling, confidential employee interviews, a company records review, and work practices and conditions observations were conducted at the truck cab and chassis assembly factory of White Motor Corporation in Exton, Pennsylvania from June 21 to 23, 1978 and February 28 and March 1, 1979 to determine potential hazards in the spray painting department. An evaluation request came from an authorized representative of an unspecified number of workers using a trademarked painting system (Centauri). Four of the 11 air lead (7439921) samples of 300, 380, 540, and 1,600 micrograms per cubic meter (micrograms/cu m) exceeded the OSHA standard of 200 micrograms/cu m for an 8 hour time weighted average. One sample of hexamethylene diisocyanate (822060) (HDI) in the cab spray booth measured 192.5 micrograms/cu m. Solvent exposures to toluene (108883), xylene (1330207), and naphtha (8030306) were well below OSHA standards of 750 milligrams per cubic meter (mg/cu m) time weighted average, 435mg/cu m time weighted average and 400 mg/cu m, respectively. Medical and environmental findings indicated repeated overexposure to HDI, and one worker had become sensitized. The author concludes that a potential health hazard exists for the workers exposed to Centauri paint and recommends that measures to control lead exposure be implemented, HDI exposure be minimized through improved respiratory protection, a less hazardous process material be substituted and some processes be automated and ventilation be improved.

PB80-193816 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. 79-16-628, Ashland Petroleum Company, 2nd Avenue, Freedom, Pennsylvania,
W. J. Chrostek, and L. Frederick. Nov 79, 18p NIOSH-HE-79-16-628

Environmental air sampling was performed and nondirect medical questionnaires were administered on March 6 and 7, 1979 at Ashland Petroleum Company, Freedom, Pennsylvania to determine if employees were exposed to bauxite (1318167) dust and unknown toxic substances. The evaluation was requested by the Oil, Chemical, and Atomic Workers International Union Local 8-621, for the 15 potentially exposed employees. The benzene (71432) soluble fraction of polycyclic aromatic hydrocarbons (PPAH) measured 0.43 milligrams per cubic meter (mg/cu m) and exceeded the OSHA recommended exposure limit of 0.20mg/cu m in one of four sampling periods. Total dust particulates ranged from 1.1 to 8.5mg/cu m, lead (7439921) was undetectable, and sulfur dioxide (7446095) gas measured 3.1 micrograms/cu m. All were below their respective recommended limits of 15mg/cu m, 50mg/cu m, and 13mg/cu m. Medical reports of acute, intermittent irritation of the eyes and mucous membranes of the upper respiratory tract, dry skin, occasional headache, sinus congestion, and wheezing with exertion were associated with increased heat and with the burning of certain products that probably contained sulfur dioxide. The authors recommend periodic vacuum cleaning of the burner house, periodic maintenance of the burner and ducts to seal leaks; a program of environmental sampling, preplacement and periodic medical examinations for exposed workers, maintaining medical records on all employees exposed for 1 or more years to sulfur dioxide, and a review of the value of the current preemployment practice of routinely recording lower back radiographs.

PB80-194038 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 79-107-632, Larry Kotlow, D.D.S., Albany, New York,
P. Pryor. Nov 79, 20p NIOSH-HE-79-107-632

Environmental samples were collected to determine airborne concentrations of waste anesthetic gas nitrous oxide (10024972) and mercury (7439976) at a dentist's office in Albany, New York on June 13 to 15, 1979. The dentist requested the evaluation on behalf of the 5 affected employees. Nitrous concentrations in personal and area samples were 10 to 30 parts per million (ppm) and 10 to 135 ppm, respectively. No OSHA standard for nitrous oxide currently exists. Direct reading measurements of mercury vapors revealed concentrations of up to 0.15 milligrams per cubic meter (mg/cu m) on office surfaces; however personal samples of mercury concentrations were within OSHA limits of 0.1mg/cu m, time weighed average and ceiling limit. The authors recommend that ventilation and maintenance improvements be made, chemical substances be isolated, and procedures for toxic waste disposal be formalized. When improvements have been implemented, a follow up evaluation should be made.

PB80-194053 PC **A08**/MF **A01**
Bendix Corp., Cocoa Beach, FL. Launch Support Div.
Development of Occupational Disease Guides.
Final rept. 23 Jun 77-15 May 78,
Barbara M. O'Connor, and George Christakis. 8 May 78, 160p
Contract PHS-NIOSH-210-77-0089
Prepared in cooperation with Miami Univ., FL. School of Medicine.

Ten guidelines for the determination of occupational diseases are presented to assist in establishing the work and substance relatedness of disease in individual workers. The chemical and common names are provided for the following 10 substances: antimony (7440360), inorganic arsenic (7440382), benzene (71432), coke oven emissions, cotton dust, inorganic lead (7439921), inorganic mercury (7439976), nitrogen dioxide (10102440), crystalline silica (7631869), and sulfur dioxide (7446095). For each substance, occupations with potential exposure, medical examinations, differential diagnosis, symptoms, clinical analysis, epidemiology, exposure data, and threshold limit values are discussed.

PB80-194194 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Technical Assistance Report No. TA 80-16, U.S. Public Health Service - Dental Clinic, Cincinnati, Ohio.
Mar 80, 13p NIOSH-HE/TA-80-16

On the basis of the data obtained in this investigation, NIOSH has determined that a health hazard to mercury exposure does not exist but that a hazard to nitrous oxide does exist. NIOSH recommendations to control this hazard are incorporated in detail.

PB80-195233 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Industrial Hygiene Section.
Walk-Through Survey Report- RF (Radio-Frequency) Radiation Exposures from Heat Sealers at S. I. Jacobson Manufacturing Company, 1414 South Wabash Avenue, Chicago, Illinois 60605,
Robert F. Herrick, Betsy Egan-Baum, and William E. Murray, Jr. 7 May 80, 20p

On June 27, 1979, NIOSH conducted a walk-through survey of the radio-frequency (RF) heat sealing area at the S.I. Jacobson Manufacturing Company, Chicago, Illinois. The purpose of the study was to identify a population of workers which could be used in a study to determine if any health effects are associated with occupational exposures to RF radiation. Electric fields produced by the RF heat sealers were measured to document exposure levels. The electric field strength levels exceeded 200 V/M (duty cycle corrected) on five of the nine heat sealers evaluated. Confounding exposures were assessed and appear not to be a factor. Personnel record systems were evaluated as to their suitability for use in a study of reproductive histories. It appears from the personnel records that an appropriate cohort of RF heat sealer workers and a corresponding control group cannot be identified, therefore, the S.I. Jacobson Manufacturing Company will not be included in the NIOSH study. Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

PB80-195241 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 79-18-627, Standard Folding Cartons, Inc., 85th Street and 27th Avenue, Jackson Heights, New York 11372,
Nicholas Fannick. Nov 79, 7p NIOSH-HE-79-18-627

A literature review, environmental sampling, and a laboratory analysis were conducted, and employees were interviewed to determine exposure to chemical compounds at the bacon carton assembly line of Standard Folding Cartons, Inc., in Jackson Heights, New York. An unspecified number of employees had requested an evaluation on their own behalf. Based on the manufacturer's information and melted bulk sample analysis, the components of a hot wax used in processing were identified as paraffin wax (8002742), butylated hydroxytoluene (128370) (BHT), and a small amount of turpentine related solvents. Air samples revealed no trace of these components, or any organic chemical except trichloroethylene (79016) which was measured at 1.0 to 1.6 parts per million (ppm). The OSHA standard for this substance is 100ppm for an 8 hour time weighted average. The authors conclude that under these conditions, no hazard existed, and no recommendations were considered necessary.

PB80-195258 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Hazard Evaluation and Technical Assistance Report No. TA 79-41, Chicago Air Route Traffic Control Center, Aurora, Illinois,
Richard S. Kramkowski, and Shawn D. McQuilkin. Nov 79, 11p NIOSH-HE-TA-79-41

Environmental and personal air, dust, and bulk samples of aerosol attic insulation material were analyzed at the request of the Federal Air Surgeon, Department of Aviation Administration, to determine if 700 employees in the Chicago Air Route Traffic Center in Aurora, Illinois were exposed to hazardous airborne asbestos (1332214) concentrations. All samples were collected on membrane filters and analyzed by phase contrast microscopy. Bulk samples were tested by polarzing and dispersion staining techniques. The insulation material contained either 2 percent or 50 to 80 percent asbestos. Air samples of less than 11,792 asbestos fibers per cubic meter were below OSHA criteria of 2 million asbestos fibers per cubic meter. Dust samples did not contain asbestos. The authors conclude that a hazard from asbestos did not exist for employees at the time of this study, except in nonroutine functions such as maintenance work in the attic or during renovations. They recommend

that anyone entering the attic wear disposable protective equipment, and any renovations be performed in a manner acceptable to OSHA.

PB80-195266 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 79-92-629, Franco American Novelty Company, Hempstead, New York,
Raymond L. Ruhe. Nov 79, 9p NIOSH-HE-79-92-629

Breathing zone and general area air sampling and a walk through survey were conducted on August 7 and 8, 1979 to determine potentially hazardous exposures to styrene monomer (100425) and methyl ethyl ketone peroxide (1338234) (MEKO) at the Franco American Novelty Company in Hempstead, New York. An authorized representative of employees from district 55, Distributive Workers of America, requested the evaluation on behalf of 13 workers, but only one caster operator was potentially exposed to styrene monomer and MEKO. Styrene concentrations ranged from 2 milligrams per cubic meter (mg/cu m) to 13mg/cu m for personal and general area samples and were below the Threshold Limit Value (TLV) of 420mg/cu m. Four MEKO samples were below the detectable limit, and one measureable sample (0.30mg/cu m), was below the TLV of 1.5mg/cu m. The author concludes that styrene and MEKO did not pose a health hazard to the caster operator and recommends that management should develop a detailed health and safety program for employee education on chemical hazards. Good personal hygiene and work practice should be observed by all employees, and better housekeeping should be practiced throughout the area.

PB80-195274 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. HE-78-31-623, Olin Corporation, Ashtabula, Ohio 44004,
Richard J. Costello, and John M. Peters. Oct 79, 9p NIOSH-HE-78-31-623

Medical evaluations of 15 workers were made at the Olin Corporation in Ashtabula, Ohio on April 27 and 28, 1978 to determine the health effects of exposure to toluene diisocyanate (26471625) (TDI), phosgene (75445), and toluene 2-4 diamine (95807) (TDA). A representative of the Oil Chemical and Atomic Workers Union, Local 7-629, requested the evaluation on behalf of 57 members, some of whom were suffering from hyperactivity, nervousness, and irritability. Thirteen of 15 workers reported upper respiratory tract symptoms, 7 reported symptoms of chronic bronchitis, 7 reported chest tightness and wheezing associated with work, and 4 of 14 had one or more abnormal pulmonary function test results. The authors conclude that the rate of reported respiratory signs and symptoms was higher than expected among the 15 workers, but some symptoms may be related to stress. The 15 workers may not be a representative sample of the 57 employees. The following steps are recommended: the entire factory population should be surveyed periodically for symptoms of lower respiratory tract disease and lung function abnormalities that may be caused by chemical exposure; TDI exposure should be ended for sensitized workers or for those with excessive decline in lung function; and liver function and genetic damage evaluations should be performed periodically on TDA exposed workers.

PB80-195282 PC **A03/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. 79-48-626, Lever Brothers Company, Pagedale, Missouri 63133,
Raymond L. Hervin, Michael T. Donohue, Raymond L. Ruhe, and David Peter. Oct 79, 30p NIOSH-HE-79-48-626

On April 9 through 12, 1979, employees were given medical interviews and examinations, and environmental samples were analyzed to evaluate complaints of dermatitis, dizziness, and soreness of mucous membranes during detergent manufacturing operations at Lever Brothers Company, Pagedale, Missouri. An unidentified individual requested the evaluation on behalf of 28 affected employees. Results of environmental sampling and determination of total and respirable dusts, and of alkaline in the form of sodium carbonate (497198) and bicarbonate (144558), indicated respirable dust concentrations of 0.1 to 0.6 milligrams per cubic meter (mg/cu m) which were well below the OSHA standard of 5.0mg/cu m. Most dusts were in the large particulate or granular, nonrespirable range, but presented contamination problems on hair, skin, and clothing. Sodium carbonate and sodium bicarbonate concentrations were 11.13 and 2.89mg/cu m, respectively. Physical examinations confirmed the validity of the workers' complaints. The authors conclude that environmental conditions at this company were potentially toxic and recommend evaluation and modification of the current engineering controls and respiratory protection program, introduction of an improved education program, continued development and enforcement of health and safety programs, prevention of heat stress, and improved maintenance.

PB80-195290 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Project No. HE-79-49-631, Dana Corporation-Spicer Universal Joint Division, 400 South Miller Avenue, Marion, Indiana 46952,
Shawn D. McQuilkin, Mitchell Singal, and Linda Shea. Nov 79, 25p NIOSH-HE-79-49-631

Environmental and personal air samples were analyzed, employees were interviewed and given a questionnaire, and an odor identification test was conducted at Dana Corporation-Spicer Universal Joint Division, Marion, Indiana, in January, 1979 to determine the cause of complaints of mucous membrane irritation. The company employed 990 production and maintenance personnel. The evaluation was requested by the Allied Industrial Workers of America on behalf of 58 affected employees in Department 256. Breathing zone and environmental samples of carbon monoxide (630080), ozone (10029156), oxides of nitrogen, sulfur dioxide (7446095), hydrogen sulfide (7783064), methyl chloroform (71556), and petroleum naphtha (8030306) were well within OSHA criteria of 50 parts per million (ppm), 0.1ppm, 5 to 25ppm, 0.5ppm, 20ppm, 350ppm, and 2,000 milligrams per cubic meter, respectively. A qualitative examination of bulk residue taken from the compressed air system revealed the presence of phthalic anhydride (85449), a potent irritant and a possible decomposition product of the synthetic compressor oil. The company was informed of the problem and appropriate efforts were undertaken to rectify the situation; no exposures to irritants were reported as of March 22, 1979. Recommendations by NIOSH include: cleaning or replacing the air supply system if new employee complaints should occur, protecting the worker who cleans the line from residual contamination, and providing a medical evaluation for any symptomatic employee, focusing on the possibility of hypersensitivity to phthalic anhydride.

PB80-195308 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Evaluation and Technical Assistance, Report No. HE 78-71-633, Kentile Floors, Inc., Brooklyn, New Y
P. L. Belanger, and E. Elesh. Nov 79, 25p NIOSH-HE-78-71-633

Environmental air sampling, medical interviews and evaluations, and observations of work practices were conducted at Kentile Floor, Incorporated, Brooklyn, New York on July 10, September 25 and 26, and October 23 to 25, 1978 to evaluate exposures to asbestos (1332214), asphalt (8052424), vinyl chloride monomer (75014), dyes and pigments. The company employed 370 workers, and an authorized employee representative requested the evaluation on behalf of approximately 75 affected employees. Three of 30 environmental air samples for asbestos (0.11, 0.11, and 0.12 fibers per cubic centimeter) exceeded the OSHA recommended criteria of 0.10 fibers per cubic centimeter. All other parameters tested were within recommended exposure limits. The only evidence of work related illness involved one case of contact dermatitis. NIOSH recommendations include proper use of exhaust ventilation, use of safety equipment in all operations, identification of carcinogenic chemicals, proper cleaning of the work clothes of men exposed to asbestos, and elimination of the use of dianisidine.

PB80-196710 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. 78-57-579, Amoco Texas Refining Company, Texas City, Texas,
Harry L. Markel, Jr., and W. Elva Elesh. Apr 79, 14p NIOSH-HE-78-57-579

Environmental and medical evaluations were conducted on May 2, 1978 at the quality control laboratory of the Amoco Texas Refining Company in Texas City, Texas (Standard Industrial Classification 2911), in response to a request from an authorized employee representative of the Oil, Chemical and Atomic Workers International Union to determine possible toxic exposure to benzene (71432) among approximately 60 employees. Personal and general air samples were analyzed for benzene, toluene (108883), and xylene (1330207) content. Medical interviews were conducted and relevant medical records of nine laboratory workers were reviewed. Air sample analysis revealed no benzene, toluene, or xylene concentrations above applicable OSHA standards (30, 750, and 435 milligrams per cubic meter, 8 hour time weighted average, respectively). The authors conclude that there was no medical evidence of benzene toxicity in this work force. Recommendations resulting from the evaluation include keeping toxic chemical exposure to a minimum, instructing workers in continued adherence to good hygiene and health practices, and medically observing those workers who show persistent, though nonwork related, blood abnormalities.

PB80-198922 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. HE 79-54-578, Horizon House Institute for Research and Development, Philadelphia, Pennsylvania,
Gary L. White. Apr 79, 8p NIOSH-HE-79-54-578

Environmental and medical evaluations were conducted on February 27 and 28, 1979 at the Horizon House Institute for Research and Development (Standard Industrial Clasification 8922) in Philadelphia, Pennsylvania in response to a request from an authorized employee representative to determine a possible hazard to approximately five employees from exposure to unknown odors in the workplace. Direct reading instruments were used to evaluate environmental conditions and to check for airborne contamination from carbon monoxide (630080), carbon dioxide (124389), oxides of nitrogen, ozone (10028156), and total organic vapors. Each employee was given a nondirective medical questionnaire to complete. No toxic exposures to any of the contaminants were found. The kitchen exhaust was not functioning and was allowing odors to downdraft into the work area, and gas stove pilot lights were emitting a slight gas odor. Relatively high temperatures (80 degrees F), low relative humidity (approximately 15 percent), and borderline inadequate lighting (45 to 60 footcandles) were observed. Three employees reported adverse health effects. The author concludes that no toxic agents were present to account for the alleged health effects, but environmental conditions could have produced the reported symptoms. The repairing of exhaust ventilation, lowering of room temperatures, use of brighter lighting, and installation of a portable humidifier are recommended by the author.

PB80-198930 PC **A02/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.

Hazard Evaluation and Technical Assistance Report No. TA 79-11, Smithsonian Institution, Washington, DC. and Suitland, Maryland,
Frank A. Lewis. Apr 79, 12p NIOSH-HE-TA-79-11

General air samples were taken at the Smithsonian Institution (Standard Industrial Classification 8411) of Washington, D.C., and at Suitland, Maryland on January 24 and 25, 1979, to determine if employees were exposed to fibers from asbestos (1332214) walls and ceilings at the Museum of Natural History, History and Technology Building, Fine Arts Building, and the Portrait Gallery. The evaluation request came from the institution to evaluate the effectiveness of control efforts that were instituted following a previous evaluation. Sampling equipment was placed at various sites throughout the buildings and phase contrast microscopy was used to analyze the samples. Rainfall provided a disturbed condition. All 20 samples taken were below the analytical limit of detection (0.01 fibers per cubic centimeter), and below the OSHA standard of 2 fibers per cubic centimeter for an 8 hour time weighted average. Although the insulation material contained up to 75 percent asbestos, masonite panel covers were effective in controlling airborne asbestos fibers. The author's general recommendations include regular vacuuming, sampling when environmental conditions change, and using sealants. Special recommendations for the Fine Arts Building include air sampling in the attic during maintenance procedures, the use of respirator protective equipment, and regular clearing of asbestos from the ventilation system. In unoccupied buildings, insulation material should be removed when possible and surveillance should continue when removal is unfeasible. Dropped ceilings or paneled enclosures are acceptable means of control. Development of the Smithsonian health, safety, and hygiene program should be continued.

PB80-198948 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. 78-84-581, Harbison-Walker Refractories, Clearfield, Pennsylvania,
Walter J. Chrostek, and Michael T. Donohue. Apr 79, 19p NIOSH-HE-78-84-581

Medical and environmental evaluations were conducted from July 10 to 14, 1978 at facilities Numbers 1 and 3 of the Harbison-Walker Refractories (Standard Industrial Classification 5085) in Clearfield, Pennsylvania. The evaluations were in response to an authorized employee request to determine whether exposures to refractory dust were causing silicosis and other lung problems among approximately 310 employees. Work atmosphere and personal air samples were analyzed for quartz (14808607) and cristobalite (14464461) content. Medical interviews, chest x-rays, spirometry tests, and chest examinations were performed on 227 workers. Respirable crystalline quartz concentrations (less than 0.5 to 33.0 milligrams per cubic meter) exceeded the OSHA standard of 10 milligrams per cubic meter divided by the silicon dioxide (7631869) percentage plus 2 for dust with more than 5 percent silicon dioxide at operation sites. Respiratory complaints were common, but no evidence of silicosis or reduction of pulmonary function was observed. Recommendations resulting from the evaluation include establishing a periodic ventilation maintenance program; providing medical examinations to all exposed workers; and initiating medical evaluations of employees with respiratory or pulmonary problems to determine possible job reassignment.

PB80-199243 PC **A03**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report HE 78-138-580, Tecumseh Products Company, 900 North Street, Grafton, Wisconsin 53024,
Clifford L. Moseley, Michael Colligan, Linda Murray, James Melius, and Timothy Bridge. Apr 79, 36p NIOSH-HE-78-138-580

Medical records were reviewed, employees and management were interviewed, a specialized questionnaire was distributed, and personal and area environmental samples were taken in the Carburetor and Engine Assembly Areas of the Tecumseh Products Company (Standard Industrial Classification 3714) in Grafton, Wisconsin on October 19 and 20, 1978. An authorized employee representative requested the investigation to determine why employees were becoming ill and fainting during engine and carburetor assembly. Measurable concentrations of 1,1,1-trichloroethane (71556) and carbon monoxide (630080) (CO) were found in both assembly areas, however, the values were below the OSHA exposure criteria of 350 and 50 parts per million, respectively. Two cases of elevated carboxyhemoglobin values were found, but no toxic exposures or related toxic reactions were identified. The investigators suggest that the initial illness outbreak was related to psychological stress among the workers, and that there was a contagious reaction. They recommend increasing and improving space and ventilation and decreasing vapors and odors, and suggest that employees be informed of first aid methods and reasons for environmental adjustments. A program of environmental surveillance or biological monitoring also is recommended, and if significant CO levels persist, ambient CO monitors equipped with a warning system should be installed.

PB80-199250 PC **A03**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Health Hazard Evaluation Determination Report No. 77-55-583, Brubaker Tool Company, Millersburg, Pennsylvania,
Wesley E. Straub. Apr 79, 32p NIOSH-HE-77-55-583

Medical interviews and skin examinations were conducted, and the pH and total alkalinity of cutting and grinding fluids were evaluated on April 10 and 11, 1978, at the Brubaker Tool Company (Standard Industrial Classification 3545) in Millersburg, Pennsylvania. The evaluations were in response to an employee representative request concerning skin rashes and irritation among workers in the wet grinding department. Thirty employees were considered to be affected. Skin irritation tests of the fluids were performed in the laboratory on 5 white albino rabbits. The dermatitis was attributed to the pH of cutting and grinding fluids (pH range 9 to 11), which were particularly irritating in neat concentrations, the presence of excessive particulate matter from tools and grinding wheels, the use of abrasive soap as a routine hand cleaner in washrooms, and contact with solvents in the thread grinding department. Potential hazards existed from possible benzene (71432) exposure, and from excessive noise in the thread department. For alleviation of the dermatitis hazard, the investigator recommends that barrier cream and waterless, nonabrasive hand cleaner be made generally available and be scrupulously utilized, fluids with less alkalinity be substituted for current ones, fluid concentrations be kept to minimum effective levels, fluids be frequently changed to remove abrasive waste particles, and workers be educated about factors which cause dermatitis.

PB80-199276 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Health Hazard and Technical Assistance Branch.
Hazard Evaluation and Technical Assistance Report No. TA 79-2, Department of Transportation, Vehicle Inspection Stations, Washington, DC,
Richard W. Gorman. Apr 79, 23p NIOSH-HE-TA-79-2

Atmospheric air samples were analyzed, and pre- and post-shift carboxyhemoglobin levels were measured to determine employee exposures to carbon monoxide (630080), lead (7439921), asbestos (1332214), hydrogen sulfide (7783064) and sulfur dioxide (7446095) at the Northeast and Southwest Vehicle Inspection Stations (Standard Industrial Classification 754) in Washington, DC, on November 7 and 8, 1978. The survey was requested by the Office of Administration, Department of Transportation, Government of the District of Columbia, to evaluate exposures of approximately 18 inspectors during routine vehicle inspections. All asbestos, hydrogen sulfide, and sulfur dioxide concentrations were below detectable limits. Carbon monoxide and lead concentrations were below the OSHA standards of 50 parts per million and 20 milligrams per cubic meter, respectively, for an 8 hour time weighted average (TWA) at both facilities. Exposures were affected by weather conditions and the number of vehicles tested daily. The investigator concludes that fluctuating concentrations hampered the evaluation of long term health effects. There was a potential for high exposures to lead and carbon monoxide, especially at the busier Southwest station. Local and increased ventilation at the first and last inspection stops, preemployment cardiovascular medical examinations, personnel rotation, air conditioned squad rooms, vehicle number limitations, daily vacuuming, use of gloves, hand washing, scheduled inspections, and education concerning the hazards of smoking are recommended by the author.

6L. Medical and Hospital Equipment

AD-A085 521/3 PC **A04**/MF **A01**
Civil Engineering Lab (Navy) Port Hueneme CA
Electromagnetic Susceptibility Testing of Neurophysiological Equipment.
Final rept. Oct 78-Oct 79,
James L. Brooks. Feb 80, 51p Rept no. CEL-TR-876

A series of electromagnetic susceptibility tests were conducted on electromyographs, electroencephalographs, and an echoencephalograph. The tests were to determine the amount of electromagnetic shielding required to provide the proper operational environment needed in hospital neurophysiological departments. The results showed that careful arrangement of the electrode conductors can significantly decrease the susceptibility of the equipment. In addition, it was found that electromagnetic shielding provides minimum protection for the electroencephalograph because of its limited frequency response. Therefore, it is not recommended unless electromyographs (wide frequency range) are present or their use is anticipated. (Author)

6M. Microbiology:

AD-A085 410/9 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Correlation of Autoagglutination and Virulence of Yersiniae,
Walter J. Laird, and Dan C. Cavanaugh. 1980, 4p
Pub. in Jnl. of Clinical Microbiology, v11 n4 p430-432 Apr 80.

No abstract available.

AD-A085 537/9 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Shigella Toxin Inhibition of Binding and Translation of Polyuridylic Acid by Escherichia coli Ribosomes,
John G.Olenick, and Alan D. Wolfe. 1979, 6p
Pub. in Jnl. of Bacteriology, v141 n3 p1246-1250 Mar 80.

No abstract available.

AD-A085 553/6 PC **A02**/MF **A01**
Institute for Medical Research Kuala Lumpur (Malaysia)
An Ecological Study of Rickettsia tsutsugamushi in the Primary Forest of Taman Negara, Peninsular Malaysia,
A. L. Dohany, B. L. Lim, D. M. Robinson, and D. L. Huxsoll. 1979, 6p
Grant DAMD17-75-G-9399
Pub. in Jnl. of Medical Entomology, v17 n1 p35-38, 31 Jan 80.

No abstract available.

PB80-194186 PC **A02**/MF **A01**
Environmental Monitoring and Support Lab.-Cincinnati, OH.
Survival of Enteric Viruses Under Natural Conditions in a Subarctic River.
Journal article,

Daniel R. Dahling, and Robert S. Safferman. Dec 79, 10p EPA-600/J-79-093
Pub. in Jnl. of Applied and Environmental Microbiology v38 n6 p1103-1110 Dec 79.

The survival of enteric viruses was studied in the vicinity of Fairbanks, Alaska at selected stations along a 317-km section of the Tanana River. This section was located downstream from all known domestic wastewater sources and was effectively sealed by a total ice cover. The mean flow time through the region was 7.1 days, during which initial viral population showed a relative survival rate of 34%. The tracing of native viruses at such great distances in the complete absence of other point and nonpoint viral sources has not been previously reported. Of the two methods of virus concentration used, viral recoveries from the disk adsorption virus elution procedure were far greater than those achieved with the Aquella system employed at that time. The fact that the ratio of enteric viruses to fecal indicator bacteria was not constant clearly inferred that these bacteria were not an effectual measure of virus concentration. The persistence of fecal coliforms and fecal streptococci, however, attested to the microbiological health risk involved.

PB80-194590 PC **A02**/MF **A01**
Health Effects Research Lab., West Kingston, RI.
Pseudomonas Aeruginosa-Fecal Coliform Relationships in Estuarine and Fresh Recreational Waters.
Journal article,
Victor J. Cabelli, Harriet Kennedy, and Morris A. Levin. 1976, 12p EPA-600/J-76-102
Pub. in Jnl. Water Pollution Control Federation, v48 n2 p367-376 Feb 76. Prepared in cooperation with Evanston-North Shore Health Dept., IL.

This study has shown that Pseudomonas aeruginosa cannot be used as the basis of water standards for the prevention of enteric disease during the recreational use of surface waters. However, P. aeruginosa determinations, when used in conjunction with the assay of fecal coliforms or some other indicator organism, could be of considerable value in the development of criteria for recreational waters. P. aeruginosa determinations could provide useful information relative to the nature of pollution sources. The finding of high P. aeruginosa densities coincident with high fecal coliform levels (PA:FC ratios >20) should signal the possibility that the source of the fecal coliforms may not be fecal wastes.

PB80-196991 PC **A02**
University of Southern Mississippi, Hattiesburg. Dept. of Microbiology.
Natural Enterovirus and Fecal Coliform Contamination of Gulf Coast Oysters,
R. D. Ellender, J. B. Mapp, B. L. Middlebrooks, D. W. Cook, and E. W. Cake. Feb 80, 8p MASGP-78-042, NOAA-80050903
Grant NOAA-04-8-M01-92
Pub. in Jnl. of Food Protection, v43 n2 p105-110 Feb 80. Prepared in cooperation with Gulf Coast Research Lab., Ocean Springs, MS.

The number of fecal coliforms and enteroviruses present in oysters and/or their growing waters of two Mississippi reefs were determined over a 12-month period. Bacterial and viral levels reflected the classification of the waters at each location as set by the Mississippi State Board of Health in compliance with the National Shellfish Sanitation Program, but statistically significant correlations between these levels were not observed. Twelve viral isolates were found at an approved oyster harvesting location, eight of which were identified as poliovirus type 1. At the prohibited site, 146 viruses were isolated including poliovirus types 1 and 2, echovirus type 24 and several isolates which remain to be identified. The number of virus isolates from samples from each location represented approximately 35% of the number of plaques observed; however, no consistent ratio of plaque to confirmed virus was demonstrated. The results suggest that the fecal coliform levels in oyster growing waters do not reflect the level of virus contamination in either approved or prohibited waters.

6O. Pharmacology

AD-A085 351/5 PC **A04**/MF **A01**
Salk Inst Swiftwater PA Government Services Div
Development of Special Biological Products.
Annual progress rept. 1 Jan-31 Dec 79,
Joseph L. DeMeio, Donald E. Craig, William J. Thomas, and Chung K. Lee. Jan 80, 51p Rept no. 44-95-0180-TSI002
Contract DAMD17-78-C-8018

This report covers the following biological research and developments: (a) Rift Valley Fever (RVF) Vaccine Development - RVF vaccine was prepared and tested. Experiments were done and lots tested for residual live virus. Shipments of vaccine were made to Israel and USAMRIID. Submission for Lots 4 through 10 was prepared. A vaccine prepared in BHK-21 cells for animal use was delivered. A second lot of diagnostic antiserum was prepared and shipped. Disrupted RVF was sent to Dr. Milstien. Vaccine prepared by Agouza Institute was tested; (b) Rift Valley Fever (RVF) HA Antigen - Five liters of antigen were prepared; (c) Rift Valley Fever (RVF) H1849 Virus Strain - The H1849 strain of RVF virus was tested; (d) Rift Valley Fever (RVF) SA-51 Virus Strain- Growth curves and potency tests were done; (e) VEE (C-84) Vaccine Development - A pilot-run was conducted; (f) Venezuelan Equine Encephalomyelitis (VEE) Vaccine Immunizations - Plaque reduction neutralization tests were performed on sera from seven new employees; (g) Tissue Culture - Production lots of FRhL-2 and MRC-5 were stabilized and frozen. Two of the lots of FRhL-2 were certified; (h) Pasteurella Tularensis, Live - Seventeen vials of the SCHU-S5 strain were transferred to USAMRIID; and (i) Eastern Equine Encephalitis (EEE) Vaccine Development - Two hundred vials were shipped.

AD-A085 408/3 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Kinetics of a New Antimalarial, Mefloquine,
Robert E. Desjardins, C. L. Pamplin, III , J. von Bredow, K. G. Barry, and C. J. Canfield. 22 Feb 79, 11p
Pub. in Mefloquine Kinetics, v26 n3 p372-379 Sep 79.

No abstract available.

AD-A085 411/7 PC **A02**/MF **A01**
Walter Reed Army Medical Center Washington DC
New Developments in Malaria Chemotherapy Using In Vitro Cultures,
W. H. G. Richards, J. D. Haynes, L. W. Scheibel, R. Sinden, and R. E. Desjardins. 1980, 6p
Pub. in Current Chemotherapy and Infectious Disease, Proceedings of the ICC (11th) and the ICAAC (19th), American Society of Microbiology, p10-13 1980.

No abstract available.

AD-A085 412/5 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Naloxone Acts at Central Opiate Receptors to Reverse Hypotension, Hypothermia and Hypoventilation in Spinal Shock,
John W. Holaday, and Alan I. Faden. 27 Dec 79, 7p
Pub. in Brain Research, v189 p295-299 1980.

No abstract available.

N80-26029/2 PC **A03**/MF **A01**
Royal Aircraft Establishment, Farnborough (England).
Chances of Detecting and Differentiating Central System Effects of Drugs in Animal Experiments with Special Consideration of Behavioural Pharmacological Methods.
F. Hoffmeister, and W. Wuttke. Nov 79, 44p
RAE-LIB-TRANS-2034, BR73312
Transl. into English from Arzneim. Forsch. (Germany, F.R.), V. 25, No. 7A, 1975 p 1162-1178.

Animal experimental methods suitable for the assessment of actions of drugs of the central nervous system are described with special reference to behavioral actions. The value of those methods for the prediction of central nervous actions of drugs in man are discussed.

PATENT-4 200 639 Not available NTIS
Department of Agriculture, Washington, DC.
Sesbanine and the Use Thereof in Treating Leukemic Tumors.
Patent,
Richard G. Powell. Filed 29 Mar 79, patented 29 Apr 80, 5p PB80-195191, PAT-APPL-6-025 131 Supersedes PB-296 771.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A novel alkaloid compound named 'sesbanine' has been produced from the tissue of a leguminous plant known as Sesbania drummondii. Sesbanine has proven to be effective in causing the remission of leukemic tumors in animals.

6P. Physiology

AD-A085 364/8 PC **A02**/MF **A01**
Texas Univ At Dallas Callier Center for Communication Disorders
Phase Locking in Monaural and Binaural Medullary Neurons: Implications for Binaural Phenomena,
G. Crow, A. L. Rupert, and G. Moushegian. 31 Sep 77, 11p AFOSR-TR-80-0409
Grant AFOSR-73-2485
Pub. in Jnl. of Acoustical Society of America, v64 n2 p493-501 Aug 78.

No abstract available.

AD-A085 535/3 PC **A03**/MF **A01**
Naval Submarine Medical Research Lab Groton CT
A Comparison of a Standard and a Computerized Adaptive Paradigm in Bekesy Fixed-Frequency Audiometry,
J. Donald Harris, and Paul F. Smith. 1979, 27p
Rept no. NSMRL-901
Pub. in Jnl. of Auditory Research, v19 p1-22 1979.

No abstract available.

AD-A085 536/1 PC **A02**/MF **A01**
Naval Submarine Medical Research Lab Groton CT
On the Use of a Three-Words-Per-Item Format in Tests for the Hearing of Speech,
J. Donald Harris. 14 Feb 79, 7p Rept no. NSMRL-926
Pub. in Jnl. of the Acoustical Society of America, v67 n1 p345-347 Jan 80.

No abstract available.

AD-A085 559/3 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
Effects of Lesions on the Ventral Medial Tegmentum on Locomotor Activity, Biogenic Amines and Response to Amphetamine in Rats,
G. Rufus Sessions, James L. Meyerhoff, G. Jean Kant, and George F. Koob. 15 Sep 79, 8p
Pub. in Pharmacology Biochemistry and Behavior, v12 n4 p603-608.

No abstract available.

AD-A085 618/7 PC **A02**/MF **A01**
Kentucky Univ Lexington Wenner-Gren Research Lab
Pressor Response Buffering by Beta-Adrenergic and Cholinergic Vasodilation in Tranquilized Dogs,
Joyce M. Evans, Charles F. Knapp, and Thomas R. Lowery. 26 Jan 78, 12p AFOSR-TR-80-0405
Contract F44620-74-C-0012
Pub. in American Jnl. of Physiology v236 n1 pH165-H173 1979.

No abstract available.

6Q. Protective Equipment

PB80-192966 PC **A10**/MF **A01**
Watkins and Associates, Inc., Lexington, KY.
A Field Investigation of Noise Reduction Afforded by Insert-Type Hearing Protectors.
Final rept.,

R. G. Edwards, W. P. Hauser, N. A. Moiseev, A. B. Broderson, and W. W. Green. 29 Jun 77, 217p
Contract PHS-NIOSH-210-76-0139
See also report dated Nov 78, PB-299 319. Prepared in cooperation with Kentucky Univ., Lexington. Medical Center.

A total of 840 attenuation measurements were made using 168 subjects and an audiometric van at six factory sites to determine effective noise reduction levels for inserted hearing protectors. Earplug design, company usage policy, worker activity, noise levels, and the effect of test sequence were correlated to noise attenuation. Protection ranged from 6 decibels (dB) at 125 hertz (Hz) to 20dB at 3,150Hz. These values were only 35 to 50 percent of the potential attenuation. No correlations were found between protection and noise levels, earplug design, or company policy, but test sequence learning occurred and the more physically active workers received better protection at 250 and 2,000Hz. The authors conclude that the lack of protection afforded by the earplug was due to improper fit and usage. Different types of hearing protectors and reasons for equipment misuse also should be investigated. Laboratory attenuation values should be derated by 60 percent to rate workplace performance accurately.

6R. Radiobiology

AD-A085 557/7 Not available NTIS
Defence Research Establishment Ottawa (Ontario)
Increased Sensitivity of Mammalian Cells Irradiated at High Dose Rates under Toxic Conditions,
J. W. Purdie, E. R. Inharber, and N. V Klassen. 6 Apr 79, 5p DREO-805, NRC-17949
Availability: Pub. in International Jnl. of Radiation Biology and Related Studies in Physics, Chemistry and Medicine, v37 n3 p331-335 1980 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A085 801/9 PC **A06**/MF **A01**
Science Applications Inc McLean VA
Analysis of Radiation Exposure for Task Force BIG BANG, Shot GALILEO. Exercise Desert Rock VII - VIII Operation Plumbbob.
Final rept. 27 Feb 78-19 Jul 79,
J. L. Goetz, D. Kaul, J. Klemm, J. T. McGahan, and W. K. McRaney. 9 Apr 80, 101p SAI-79-844-WA, DNA-4772F
Contract DNA001-78-C-0186

The radiation doses to Task Force BIG BANG troops who participated in Shot GALILEO are determined and compared with film badge data gathered during Exercise Desert Rock VII-VIII. Fallout contours and decay rates, are established and used to calculate total external beta and gamma doses, based on estimated stay time for various troop activities. Uncertainties are calculated for each parameter. Radiation dose from internal emitters, due to inhalation of resuspended contaminated particles, is calculated. Total external gamma dose is estimated to be 1070-1780 mrem as compared with a mean film badge reading of 1900 mrem. 50-year bone dose, due to internal emitters, is estimated to be 10-25 mrem. (Author)

CONF-791103-101 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Comparison of Potential Radiological Impacts of exp 233 U and exp 239 Pu Fuel Cycles.
H. R. Meyer, C. A. Little, J. P. Witherspoon, and J. E. Till. 1979, 5p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

Nuclear fuel cycles utilizing exp 233 U are currently the subject of considerable interest in the United States. This paper focuses on the identification of significant differences between the off-site radiological hazards posed by exp 232 Th/ exp 233 U (Th/U) and exp 238 U/ exp 239 Pu (U/Pu) fuel cycles, and represents a portion of our involvement in the Nonproliferation Alternative Systems Assessment Program (NASAP), to be used in support of the International Fuel Cycle Evaluation (INFCE). The major contributors to radiological dose are likely to be uranium mining and milling (58.5% of total fuel cycle dose), reprocessing (33.9%), and light-water reactor power generation (7.3%). The remainder of the cycle, including enrichment processes, fuel fabrication, transportation, and waste management, contributes only 0.3% to total estimated fuel cycle dose. (ERA citation 05:020198)

CONF-800427-1 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Updating the Tritium Quality Factor: The Argument for Conservatism.
J. E. Till, E. L. Etnier, and H. R. Meyer. 1980, 5p
Contract W-7405-ENG-26
Tritium technology in fission, fusion, and isotopic application, Dayton, OH, USA, 29 Apr 1980.

Estimated doses resulting from tritium releases to the environment are linearly dependent upon the quality factor (Q) chosen for tritium beta radiation. In 1969 the International Commission on Radiological Protection (ICRP) recommended using 1 as the Q for all low energy beta radiation. Considerable improvements have been made in evaluating exposures to tritium at very low dose rates and in refining physiological and biological endpoints since the 1969 ICRP recommendations. This study summarizes recent experiments to determine the relative biological effectiveness of tritium. Based upon our study of published data related to quality factor, its importance in the calculation of dose, and the currently accepted conservative philosophy in radiation protection, it is concluded that a value of 2 would seem to be more defensible for environmental assessments and that a reevaluation of the tritium quality factor by the ICRP is needed. (ERA citation 05:021448)

CONF-800427-3 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Estimated Radiation Dose from Timepieces Containing Tritium.
L. M. McDowell-Boyer. 1980, 23p
Contract W-7405-ENG-26
Tritium technology in fission, fusion, and isotopic application, Dayton, OH, USA, 29 Apr 1980.

Luminescent timepieces containing radioactive tritium, either in elemental form or incorporated into paint, are available to the general public. The purpose of this study was to estimate potential radiation dose commitments received by the public annually as a result of exposure to tritium which may escape from the timepieces during their distribution, use, repair, and disposal. Much uncertainty is associated with final dose estimates due to limitations of empirical data from which exposure parameters were derived. Maximum individual dose estimates were generally less than 3 mu Sv/yr, but ranged up to 2 mSv under worst-case conditions postulated. Estimated annual collective (population) doses were less than 5 person/Sv per million timepieces distributed. (ERA citation 05:021173)

DOE/EV-0066/10 PC **A04**/MF **A01**
Department of Energy, Washington, DC. Div. of Operational and Environmental Safety.
Tenth Annual Report of Radiation Exposures for DOE and DOE Contractor Employees, 1977.
Mar 80, 63p
Contract EY-76-C-06-1830

This report contains the 1977 radiation exposure data for DOE and DOE contractors. (ERA citation 05:023074)

DOE/TIC-11176 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Health Effects of Low Level Radiation.
J. A. Auxier. 1980, 13p
Contract W-7405-ENG-26

A short review of the health effects of low level of radiation is presented. Emphasis is placed on effects on bone marrow and incidence of leukemia. Dose-response curves are presented. (ERA citation 05:021294)

INIS-mf-4726 MF **A01**
Oslo Univ. (Norway). Inst. of Physics.
Radiation Damage to DNA Constituents. An Electron Spin Resonauce Study of Radiation-Induced Freeradicals in Pyrimidine Derivitives.
R. Bergene. 1977, 126p
Thesis.
U.S. Sales Only. Microfiche copies only.

The molecular changes of the DNA molecule, in various systems exposed to inoizing radiation, have been the subject of a great number of studies. In the present work electron spin resonance spectroscopy (ESR) has been applied to irradiated crystalline systems, in particular single crystals of DNA subunits and their derivatives. The main conclusions about the molecular damage are based on this technique in combination with molecular orbital calculations. It should be emphasized that the ESR technique is restricted to damage containing unpaired electrons. These unstable intermediates called free radicals seem, however, to be involved in all molecular models describing the action of radiation on DNA. One of the premises for a detailed theory of the radiation induced reactions at the physico-chemical level seems to involve exact knowledge of the induced free radicals as well as the modes of their formation and fate. For DNA, as such, it is hardly possible to arrive at such a level of knowledge since the molecular complexity prevents selective studies of the many different radiation induced products. One possible approach is to study the free radicals formed in the constituents of DNA. In the present work three lines of approach should be mentioned. The first is based on the observation that radical formation in general causes only minor structural alterations to the molecule in question. The use of isotopes with different spin and magnetic moment (in particular deuterium) may also serve a source of information. Deuteration leads to a number of protons, mainly NH - and OH, becoming substituted, and if any of these are involved in interactions with unpaired protons the resonance pattern is influeneed. The third source of information is molecular orbital calculation. The electron spin density distribution is a function in the three dimensional space based on the system's electronic wave functions. (Atomindex citation 11:499537)

INIS-mf-5390 MF **A01**
Marburg Univ. (Germany, F.R.). Fachbereich Humanmedizin.
X-Ray Effects on the Activity of a Mg exp 2+ - Dependent, Na exp + - and K exp + -Activable Microsomal Membrane ATP-Ase System.
D. Froehlich. 16 Jun 78, 79p
In German.Thesis.
U.S. Sales Only. Microfiche copies only.

The bahviour of a Mg exp 2+ -dependent, Na exp + - and K exp + -activable ATP-ase sytem on irradiation was investigated using a microsome fraction of guinea pig myocardial cells prepared by fractionated centrifugation. The Na exp + - and K exp + -activable component, transport-ATPase, was particularly radiation-sensitive. Three stages of development were observed for a 1,500 R radiation damage until 24 h p.r.. In the first stage, until 30 minutes p.r., the activity of transport-ATP-ase was inhibited. This was followed by repair processes which had reached a peak value clearly higher than the control values at 4 hours p.r.. In the third stage, the activity was reduced again; 15 and 24 hours after termination of exposure, values again were nearly the same as after 30 minutes where a maximum was observed for this radiation dose. Radiation-induced electrolyte displacements, active transport, and radiation-induced inhibition of transport-ATP-ase were correlated and discussed; the assumption was that changes in, the electrolyte conditions in the membranes on irradiation are at least partly due to the described inhibition of transport-ATP-ase. (Atomindex citation 11:499545)

NUREG/CR-1174 PC **A07**/MF **A01**
Equifax, Inc., Reading, MA. Health Systems Div.
A Study to Determine the Feasibility of Conducting Epidemiologic Investigations of the Health Effects of Low-Level Ionizing Radiation. Phase I Report.
Interim technical rept. 3 Jul 79-15 Jan 80,
N. A. Dreyer, R. W. Clapp, S. J. Covino, Jr., F. H. Fahey, and E. R. Friedlander. Jan 80, 132p

This is the six-month interim report of 'A Study to Determine the Feasibility of Conducting Epidemiologic Investigations of the Health Effects of Low-Level Ionizing Radiation', begun July 3, 1979. The study defines low-level radiation as either doses

up to 5 rem (whole-body) per year or doses up to 50 rem (whole body) cumulative. The overall intent of the study is a dual one: (1) to insure that all likely exposed population groups are identified, and (2) to determine at the operational level the requirements for feasibility, i.e. study design, data gathering, information potential and cost for future epidemiologic studies of low-level radiation exposure. Three criteria were developed to select the best prospects for in-depth feasibility studies of the dose-response relationship in the low-dose range. A rigorous application of these criteria would have eliminated all candidates from consideration. Nevertheless, the authors selected seven broadly-defined low-exposure groups that seemed most promising. These groups were exposed to either occupational or diagnostic medical radiation. In addition, owing to strong public interest, the authors selected three groups with special environmental radiation exposures, although this was not specifically required by the contract.

NUREG-0668-SUM PC **A02**/MF **A01**
Nuclear Regulatory Commission, Washington, DC. Office of Nuclear Reactor Regulation.
Staff Review of 'Radioecological Assessment of the Wyhl Nuclear Power Plant': Analysis of the Report Prepared by the University of Heidelberg, West Germany.
Draft summary rept.,
F. J. Congel, F. P. Cardile, B. Zalcman, W. J. Pasciak, and A. Chu. Jun 80, 19p

The Heidelberg Report presents an assessment of the environmental radiological impact of a proposed pressurized-water reactor to be built near Wyhl, West Germany. The assessment is based largely on mathematical models that are used to calculate doses to humans in the area surrounding a reactor site and describe the movement of radioactive materials in the environment. These are the same mathematical models that are used by the U.S. Nuclear Regulatory Commission (NRC) in licensing reactors in the United States. The NRC uses these models to make sure that any radiation exposure due to a reactor is far below national and international recommended 'safe' levels, as well as below natural radiation levels. The NRC staff reviewed certain parts of the Heidelberg Report because the report implied that the NRC may be substantially underestimating doses to individuals living near nuclear power plants by using incorrect values for parameters in the mathematical models. Although the Heidelberg Report assessment is based largely on environmental models described in four NRC Regulatory Guides, the NRC staff's review of the Heidelberg Report indicates that the Heidelberg authors used values for some model parameters that are too high.

PB80-194376 Not available NTIS
National Bureau of Standards, Washington, DC.
Wn and Neutron Kerma for Methane-Based Tissue-Equivalent Gas.
Final rept.,
L. J. Goodman, and J. J. Coyne. 1980, 14p
Sponsored in part by Department of Energy, Washington, DC., and National Cancer Inst., Bethesda, MD.
Pub. in Jnl. Radiation Research 82, p13-26 1980.

Homogeneous tissue-equivalent ionization chambers containing a methane-based gas mixture are widely used to determine the absorbed dose of neutrons employed in radiobiology and radiotherapy. Conversion of the measured ionization charge to the absorbed dose requires knowledge of Wn, the mean energy expended to form an ion pair in the gas by the initial spectra of secondary charged particles produced by the neutrons. This report discusses the computed charged particle spectra in the gas and the relative kermas contributed by the various types of charged particles. These spectra are combined with an evaluation of the available experimental data on W for the secondary particles to compute Wn as a function of neutron energy. Over the energy range of 0.1 to 20 MeV, Wn was found to vary from 32.8 to 31.0 eV, respectively, including sharp changes in Wn due to large resonances in the energy transferred to carbon and oxygen. It is recommended that the data presented be used to evaluate Wn for each neutron spectrum for which accurate dosimetry is required. A single value of 31.9 + or - 0.9 eV is recommended for less demanding applications or when neutron spectra are poorly known.

PNL-SA-8011 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Radiological Aspects of Sea Bed Dumping in the Deep Oceans.
W. L. Templeton. 1979, 19p CONF-791050-2
Contract EY-76-C-06-1830
Nuclear Energy Agency seminar on marine radioecology, Tokyo, Japan, 1 Oct 1979.

In order to control coastal discharges or ocean dumping of any kind of material, it is necessary to determine a release rate. This can only come from a knowledge of the composition and chemical form of the source materials, the distribution and bioavailability of these materials in the ocean ecosystem, the degree and rates of bioaccumulation and the actual or potential use of the ocean resources. With this information release rates within acceptable limits for man and the ecosystem can then be determined. Today, probably the only situations which apply this approach are the controlled disposal of radioactive wastes. In this paper a recent radiological assessment of the dumping of packaged radioactive wastes on the seabed is discussed and some environmental aspects of the United States Department of Energy program are described examining the feasibility of the emplacement of contained radioactive wastes within the deep ocean sediments. (ERA citation 05:020176)

SAND-79-7102 PC **A14**/MF **A01**
Lockheed Missiles and Space Co., Palo Alto, CA.
Bibliography of Marine Radiation Ecology Prepared for the Seabed Program.
V. S. Schultz. Feb 80, 318p
Contract EY-76-C-04-0789

References on the effects of ionizing radiation on aquatic organisms have been obtained from a number of sources. Many were obtained from reviews and other publications. Although the primary purpose of preparing this bibliography was to obtain information related to the nuclear wastes Seabed Disposal Biology Program of Sandia Laboratories, freshwater organisms are included as a matter of convenience and also with the belief that such a bibliography would be of interest to a wider audience than that restricted to the Seabed Program. While compilation of a list in an area broad in scope is often somewhat arbitrary, an attempt was made to reference publications that were related to field or laboratory studies of wild species of plants and animals with respect to radiation effects. Complete information concerning each reference are provided without excessive library search. Since one often finds references listed in the literature that are incompletely cited, it was not always possible to locate the reference for verification or completion of the citation. Such references are included where they appeared to be of possible value. When known, a reference is followed with its Nuclear Science Abstract designation, or rarely other abstract sources. Those desiring additional information should check Nuclear Science Abstracts utilizing the abstract number presented or other abstracting sources. In addition, the language of the article, other than English, is given when it is known to me. (ERA citation 05:020188)

6S. Stress Physiology

AD-A085 322/6 PC **A03**/MF **A01**
North Carolina Univ At Chapel Hill Auditory Research Lab
Psychoacoustic and Electrophysiologic Studies of Hearing under Hyperbaric Pressure.
Final rept. 1 Jun 70-30 Nov 79,
William G. Thomas, Joseph C. Farmer, and Peter G. Kaufmann. 1 May 80, 47p Rept no. UNC/ARL-80-1
Contracts N00014-67-A-0321, N00014-75-C-0553

This Final Report covers work performed as follows: (1) Calibration of standard microphones and earphones; (2) Measurement of human auditory thresholds; (3) Studies of human vestibular disturbances; (4) Animal electrophysiology; and (5) HPNS.

AD-A085 558/5 Not available NTIS
Defence Research Establishment Ottawa (Ontario)
Quantitative Studies of Cytological Damage in Mouse Testis Produced by Exposure to Heat,
A. B. Cairnie, and K. E. Leach. 24 Aug 79, 10p
Rept no. DREO-821
Abstract in French.
Availability: Pub. in Canadian Jnl. of Genetics and Cytology, v22 p93-102 1980 (No copies furnished by DTIC/NTIS).

No abstract available.

6T. Toxicology

AD-A085 362/2 PC **A02**/MF **A01**
California Univ Santa Barbara Inst of Environmental Stress
Cardiovascular Adjustments to Carbon Monoxide Exposure during Rest and Exercise in Dogs,
James A. Wagner, Steven M. Horvath, and Thomas E. Dahms. 4 Mar 77, 8p AFOSR-TR-80-0408
Grant AFOSR-73-2455
Pub. in Environmental Research, v15 p368-374 1978.

No abstract available.

AD-A085 470/3 PC **A02**/MF **A01**
Army Environmental Hygiene Agency Aberdeen Proving Ground MD
Topical Hazard Evaluation Program of Candidate Insect Repellents AI3-33663a and AI3-35580a, US Department of Agriculture Proprietary Compounds.
Final rept. Sep 76-Mar 80,
Allen W. Singer. 23 May 80, 9p Rept nos. USAEHA-75-51-0004-80, USAEHA-75-51-0005-80

Preliminary hazard evaluations of AI3-33663a and AI3-35580a were performed by means of laboratory animal studies using rats, rabbits, and guinea pigs. The technical grade compounds did not cause any skin, eye or photoirritation, and did not cause a sensitization reaction. They also were not acute ingestion hazards. It was recommended that both AI3-33663a and AI3-35580a be approved for further testing as candidate insect repellents. (Author)

AD-A085 615/3 PC **A02**/MF **A01**
California Univ Riverside Statewide Air Pollution Research Center
Foliar and Microscopic Observations of Bean Leaves Exposed to Hydrogen Chloride Gas,
Anton G. Endress, Tedmund J. Swiecki, and O. Clifton Taylor. 19 Jul 77, 13p AFOSR-TR-80-0407
Grant AFOSR-76-3069
Pub. in Environmental and Experimental Botany, v18 p139-149 1978.

No abstract available.

COO-2792-3 PC **A04**/MF **A01**
Cornell Univ., Ithaca, NY.
Molecular Mechanisms of the Epithelial Transport of Toxic Metal Ions, Particularly Mercury, Cadmium, Lead, Arsenic, Zinc, and Copper. Progress Report, January 1, 1979-December 31, 1979.
R. H. Wasserman. 1979, 54p
Contract EY-76-S-02-2792

The mechanism of lead transport is presented, and especially the particular similarities or dissimilarities between lead and calcium in this process. The absorption of these metals was determined cockerels, raised on a commercial diet or on a specified diet, using in vivo ligated loop procedure. The dose administered into the loop contained 0.5 mu Ci exp 203 Pb (and/or 0.1 mu Ci exp 47 Ca), and 0.01 mM lead acetate (and/or mM CaCl sub 2) in 0.5 ml 0.15 M NaCl,pH 6.5. It was shown that lead is rapidly taken up by the mucosal tissue, and slowly transferred into the body, whereas less calcium is retained by the tissue and the transfer of calcium is many times as effective as that for lead. They appear to respond in a similar manner to a low calcium intake and vitamin D treatment. Increasing luminal stable lead concentration significantly reduced the percentage of radiolead significantly reduced the percentage of radiolead ab-

sorbed, but did not affect the absorption of calcium. Also, vitamin D enhanced the transfer of plasma exp 47 Ca into the lumen but did not affect the transfer of plasma exp 203 Pb. Intravenous administration of 1,25(OH) sub 2 CC to rachitic chicks enhanced calcium and lead absorption, but the maximal absorption of these metals occurred at slightly different times after administering this metabolite, indicating that two different transport systems may be involved. It was concluded that lead is transported across the epithelial wall by a passive diffusion and this process is affected by vitamin D in a similar manner as this vitamin affects the diffusional component of calcium transport. (ERA citation 05:023150)

PB80-192339 PC **A08/MF A01**
Oak Ridge National Lab., TN.
Chemical Contaminants in Nonoccupationally Exposed U.S. Residents,
James W. Holleman, Michael G. Ryon, and Anna S. Hammons. May 80, 152p ORNL/EIS-153, EPA-600/1-80-001
Contract W-7405-eng-26

The report reviews the manner in which chemical contaminants found in nonoccupationally exposed U.S. residents enter the environment and subsequently human tissue. Approximately 100 contaminants are treated. Sources of literature used in the survey covered a 30-year period, the bulk of which was published within the past decade. Contaminants discussed include organochlorine, organophosphorus, carbonate, and miscellaneous pesticides; polychlorinated and polybrominated biphenyls and terphenyls; halogen compounds; asbestos; mercury, lead, zinc, cadmium, copper, manganese, molybdenum, selenium, arsenic, antimony, thallium, chromium, cobalt, nickel, vanadium, beryllium; and others. Production; use; entry into the environment; entry, metabolism, and effects in man; and description and evaluation of methods of analysis and validity of the data are the chief aspects treated. For pesticides, indiscriminate use is the chief means of environmental entry. Entry into man is by ingestion of particulate residues or through foods, particularly fat-containing animal products. Sources of environmental entry for metals and other elements are burning of fossil fuels, industrial operations, dissipative uses, and natural inputs. Entry in humans occurs largely by exposure to airborne particulates, and to a lesser degree through food and water. Some elements are essential or beneficial at one level of concentration and toxic at another. Discussions of the status of elements from this standpoint are included where appropriate.

PB80-192735 PC **A04/MF A01**
Safety Sciences Ltd., Chicago, IL.
Identification, Evaluation, Selection, Criteria Development and Input of Mutagenicity Data to the Registry of Toxic Effects of Chemical Substances File.
Final rept.
Jan 80, 64p
Contract PHS-NIOSH-210-76-0193

A system for identifying, evaluating, and developing selection criteria, and providing mutagenesis data from submammalian assay systems is described. Test protocols, sources of information, and access procedures for mutagenesis testing were identified and evaluated, and recommendations regarding protocols and information sources for inclusion in the Registry of Toxic Effects of Chemical Substances were made. Selection criteria were developed with regard to relevance to mutagenic testing parameters, consistency with established criteria, ease and nonambiguity of data input and file manipulation. The criteria were reviewed by experts at a 1 day conference, recommendations were made. No attempt was made to evaluate the significance of these findings or to rate the relative potency of a compound as a mutagenic risk to man.

PB80-193352 PC **A06/MF A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH.
Occupational Exposure to Talc Containing Asbestos. Morbidity, Mortality, and Environmental Studies of Miners and Millers,
John M. Dement, Ralph D. Zumwalde, John F. Gamble, William Fellner, and Michael J. DeMeo. Feb 80, 117p DHEW/PUB/NIOSH-80-115

The National Institute for Occupational Safety and Health (NIOSH) conducted studies of mortality and morbidity patterns and occupational exposures among talc miners and millers in upper New York. The mortality study was based on 398 white male workers who began employment between January 1, 1947 and December 31, 1959 and whose vital status was determined as of June 30, 1975. Observed cause specific mortality for the cohort as compared with that expected based on U.S. white male mortality rates indicated a significant increase in mortality due to bronchogenic cancer, nonmalignant respiratory disease (excluding influenza and pneumonia) and respiratory tuberculosis. The average latency period for bronchogenic cancer was 20 years.

PB80-193899 PC **A05/MF A01**
Massachusetts Univ., Amherst. Water Resources Research Center.
The Detection of Mutagenic Pollutants in Aquatic and Marine Environments: Studies of the Millers River and Boston Harbor,
Edward J. Klekowski, and William Barnes. 1980, 86p PUB-111, W80,-05541, OWRT-B-053-MASS(8)
Contract DI-14-34-0001-6087

Recent research indicates that the majority of human carcinogens are mutagens and that a significant number of mutagens are also carcinogenic. Because of this relationship, the development of techniques to determine if mutagenic pollutants are present in environments is significant. Techniques were developed to screen aquatic and marine environments for mutagenic pollutants. Three different assay protocols were studied: (1) an in-situ mutagen bioassay based upon measurements of genetic damage to indigenous members of the biota (ferns), (2) the use of bioconcentrators to accumulate mutagens (mussels) and the testing of tissue extracts with microbial assays, and (3) the physical sampling and extraction of pollutants in the environment and assaying with microbial mutagen assays. Two environments were studied with these techniques, mutagens were detected in the Millers River and mutagens were not detected in Boston Harbor.

PB80-194483 PC **A02/MF A01**
Environmental Research Lab.-Duluth, MN.
Chronic Effect of Copper on the Bluntnose Minnow, 'Pimephales notatus' (Rafinesque).
Journal article,
W. B. Horning, and T. W. Neiheisel. 12 Dec 78, 10p EPA-600/J-79-094
Pub. in Arch. Environm. Contam. Toxicol. 8, p545-552 1979.

A laboratory chronic toxicity test in which bluntnose minnows were exposed to copper in laboratory dilution water with a hardness of 200 mg/L as CaCO3 indicated that copper adversely affected fry survival, fry growth, and reproduction. The maximum acceptable toxicant concentration (MATC) for total copper based on reproductive impairment at 18.0 micrograms/L was between 4.3 (control concentration) and 18.0 micrograms/L. The 96-hr LC50 values from three acute toxicity tests ranged from 0.22 to 0.27 mg/L total copper with a mean value of 0.23 mg/L. The application factor (MATC/96-hr LC50) for bluntnose minnows and total copper was estimated to lie between 0.02 and 0.08. Bluntnose minnows held in control water for nine months ceased to spawn when they were exposed to 119.4 micrograms/L total copper. Fish exposed to 119.4 micrograms/L total copper for the same nine-month period began to spawn 60 days after being transferred to control water.

PB80-194574 PC **A04/MF A01**
SRI International, Menlo Park, CA.
Development and Validation of Methods for Sampling and Analysis of Workplace Toxic Substances.
Final rept. Jul 76-Nov 79,
Ellen C. Gunderson, and C. Clarine Anderson. Nov 79, 61p
Contract PHS-NIOSH-210-76-0123

To determine the level of exposure of workers to toxic substances, adequate sampling and analytical methods for the specific substances must be provided. The objective of this study was to develop and validate methods for sampling and analyzing 130 substances for which no methods were currently available, including gases, vapors, dusts, fumes, and aerosols. This report summarizes the experimental protocol and methodology used in the method validation effort.

PB80-194640 PC **A03/MF A01**
Oak Ridge National Lab., TN.
Proceedings of the EPA Workshop on the Environmental Scoring of Chemicals Held at Washington, DC. on August 13-15, 1979.
Final rept.,
Robert H. Ross, and Justine Welch. May 80, 48p ORNL/EIS-158, EPA-560/11-80-010

The environmental scoring of chemicals is viewed by the U.S. Environmental Protection Agency as a tool to assist in the ranking or ordering of the universe of chemicals that are under the jurisdiction of the Toxic Substances Control Act. The purpose of scoring is to identify most of the chemicals that have a high probability for requiring review for regulation or testing. This report describes a three-day workshop held in Washington, D.C., August 13-15, 1979, to develop an environmental scoring system. Initial discussions centered on the determination of a safety factor (calculated as the concentration at which an effect is observed divided by environmental concentration) that would allow a numerical score to be assigned to a chemical to reflect its potential hazard. Further discussion, however, indicated that the environmental concentration of a chemical is usually not available and that the estimation of an environmental concentration is not readily accomplished; therefore, a scoring system was developed that does not require environmental concentrations. This system relates environmental exposure to toxicity by using a multiplier (3x, 2x, or 1x) which is assigned on the basis of the concentration at which an effect is observed. The applicability of the scoring system is demonstrated by scoring selected chemicals.

PB80-194939 PC **A09/MF A01**
Environmental Protection Agency, Washington, DC. Office of Toxic Substances.
Support Document Test Data Development Standards: Chronic Health Effects. Toxic Substances Control Act. Section 4.
May 79, 179p EPA-560/11-79-001

The Proposed Chronic Toxicity Test Standards (F.R.), written under Section 4(a) and 4(b) of the Toxic Substances Control Act (TSCA), are designed to ensure the development of reliable and adequate test data for assessing the chronic health effects of natural and synthetic chemicals. Moreover, the testing requirements are not to create unnecessary economic barriers to technological innovation in the chemical industry. To fulfill these responsibilities, scientists and staff of the Environmental Protection Agency (EPA) have reviewed the literature and discussed the significant scientific and economic issues both in Agency Workgroup meetings and with consultants and reviewers from outside the Agency. The results of this effort are reflected in detail in this Support Document and the Preamble to the Chronic Health Effects Standards.

PB80-196017 PC **A02/MF A01**
Environmental Research Lab., Gulf Breeze, FL.
Toxicity and Bioconcentration of EPN and Leptophos to Selected Estuarine Animals.
Journal article,
Steven C. Schimmel, Timothy L. Hamaker, and Jerrold Forester. 1979, 13p EPA-600/J-79-086, CONTRIB-354
Pub. in Contributions in Marine Science, v22 p193-203 1979.

Acute (96-hr) flow-through toxicity tests, chronic (entire life-cycle) tests, and bioconcentration studies were conducted on selected estuarine animals with the insecticides, EPN, and leptophos. In the EPN acute toxicity tests, the test animals and their 96-hr LC50 values were: Mysidopsis bahia, 3.44 micrograms/l; Penaeus duorarum, 0.29 micrograms/l; Cyprinodon variegatus, 188.9 micrograms/l; Lagodon rhomboides, 18.3 micrograms/l; and Leiostimus xanthurus, 25.6 micrograms/l. Test animals and 96-h LC-50 values for leptophos were M. bahia, 3.16 micrograms/l; P. duorarum, 1.88 micrograms/l; and L. xanthurus, 4.06 micrograms/l. In separate chronic tests, M. bahia were

exposed to EPN and leptophos. Significant (alpha = 0.05) mortality and fewer young were produced in 4.13 micrograms/l EPN. In the leptophos chronic test, significant mortality occurred in concentrations > or = 3.63 micrograms/l and fewer young were produced in concentrations > or = 1.77 micrograms/l. L. rhomboides, exposed to EPN in a 26-day uptake study, bioconcentrated the insecticide 707 X that measured in the exposed water. The results indicate that if either contaminated an estuarine environment in concentrations > or = 1.0 micrograms/l, the most profound adverse effects on crustaceans and possibly fishes would result from acute toxicity, rather than from chronic toxicity or bioconcentration of the chemicals.

PB80-197585 PC **A08/MF A01**
Syracuse Research Corp., NY. Center for Chemical Hazard Assessment.
Investigation of Selected Potential Environmental Contaminants: Epichlorohydrin and Epibromohydrin.
Final technical rept.,
Joseph Santodonato, Sheldon S. Lande, Philip H. Howard, Denise Orzel, and Dennis Bogyo. Mar 80, 157p TR-80-543, EPA-560/11-80-006
Contract EPA-68-01-3920

This report reviews the potential environmental and health hazards associated with the commercial use of epichlorohydrin and epibromohydrin. Epichlorohydrin is used primarily as a chemical intermediate in the production of glycerin and epoxy resins, with small amounts exported or used for elastomers or other products. Epibromohydrin was last produced on a commercial scale in 1975; the only current use of epibromohydrin appears to be as a laboratory research reagent. Information on physical and chemical properties, production methods and quantities, commercial uses and factors affecting environmental contamination, as well as information related to health and biological effects, are reviewed and evaluated.

PB80-197619 PC **A10/MF A01**
Research Triangle Inst., Research Triangle Park, NC.
Multimedia Environmental Goals for Environmental Assessment. Volume I. Supplement A.
Rept. for Oct 78-Oct 79,
G. L. Kingsbury, J. B. White, and J. S. Watson. Mar 80, 224p EPA-600/7-80-041
Contract EPA-68-02-3132
See also report dated Nov 77, PB-276 919, and Volume 2, PB80-115108.

The report supplements Volume I (PB-276 919) of the two-volume 1977 EPA report that introduced a methodology to establish Multimedia Environmental Goals (MEGs) for chemical pollutants. It summarizes the original methodology and introduces minor improvements. Improvements include the assignment of a unique identification number to each MEG compound and modification of the original model used to derive MEG values for land or solid waste. Its appendices include: revised category descriptions, an updated master list of organic compounds, a candidate list of compounds to be considered for future MEGs, tabulated discharge MEG values, and hazard potential values. It also includes graphical summaries of MEGs for 586 organic chemicals. The Supplement is to be used in coordination with MEG Volumes III and IV (PB80-115108 and PB80-115116) which contain background information summaries and MEG charts for organic compounds in the new MEGs master list.

UCID-18599 PC **A05/MF A01**
California Univ., Livermore. Lawrence Livermore Lab.
Mutagenicity Testing in Mammalian Cells: Multiple Drug-Resistance Markers.
J. H. Carver, G. M. Adair, and D. L. Wandres. Aug 79, 76p EPA-600/7-79-173
Contract W-7405-ENG-48

In this study, we describe the derivation of a CHO cell line that is heterozygous for both the adenine phosphoribosyltransferase (aprt) and thymidine kinase (tk) loci. This subline allows single-step selection of autosomal recessive AA/sup r/ or FUdR/sup r/ mutant phenotypes as well as the more commonly used OUA/sup R/ or TG/sup r/ genetic markers. Biochemical and genetic characterization of the heterozygous cell line, and dose response data for mutation induction at these four genetic loci by the direct-acting mutagen, ethyl methanesulfonate (EMS), are presented. We also establish optimal conditions for the phenotypic expression and selection of AA/sup r/ and FUdR/sup r/ mutants of CHO cells and present biochemical validation of the mutant phenotypes. Optimal drug concentrations, cell plating densities, and expression time requirements are determined for all four drug-resistance markers. Mutation data are reported for direct mutagens (EMS, MNNG, NQO) and promutagens requiring metabolic activation (DMN, BP). Finally, we discuss the role and expected use of the multiple-marker mutagenesis assay to yield increased sensitivity and reliability in detecting genetic damage induced by complex pollutant mixtures of environmental concern. (ERA citation 05:023142)

7. CHEMISTRY

7A. Chemical Engineering

CONF-800528-1 PC **A03/MF A01**
Pittsburg and Midway Coal Mining Co., Englewood, CO.
SRC-II Process.
B. K. Schmid, and D. M. Jackson. 1980, 38p
Contract ET-78-C-01-3055
Discussion meeting on new coal chemistry, London, UK, 21 May 1980.

Extensive laboratory and pilot plant experimental work on the Solvent Refined Coal Process has led to the development of an improved version of the process known as SRC-II. This work has shown considerable promise and plans are being made to demonstrate the SRC-II process using commercial size equipment in a 6000 T/D plant to be located near Morgantown, West Virginia. On the basis of recent economic studies, the products (both liquid and gas) from a future large-scale commercial plant are expected to have an overall selling price of $4.00 to 5.00 per million Btu (first quarter 1980 basis). The major product of the primary process is distillate fuel oil of less than 0.3% sulfur for use largely as a non-polluting fuel for generating electrical power and steam, especially in the east where utilities and industry are presently using petroleum products. For the longer term, the major growth opportunity for SRC-II fuel oil in the generation of electric power will probably be through advanced combustion turbine units with heat recovery boilers (combined cycle units). The light liquid fractions (naphtha and middle distillate) produced by the SRC-II process can be upgraded to a high octane unleaded gasoline to supplement petroleum-derived supplies. Significant quantities of pipeline gas are also produced at a cost which should be competitive with SNG from direct coal gasification. Light hydrocarbons (ethane, propane) from the process may be effectively converted to ethylene in conventional cracking plants to offset ethylene demand from petroleum-derived naphtha and gas oil, both of which could otherwise be used for other refinery products. In addition, certain fraction of the fuel oil might also be used in medium speed diesel engines and automotive gas turbines. (ERA citation 05:021629)

DOE/METC/8055-9 PC **A03/MF A01**
Dravo Corp., Pittsburgh, PA. Synthetic Fuels Dept.
Hydrogasifier Development Commercial Design of Single-Stage Commercial Scale and Process Development Scale Hydrogasifiers.
J. M. Hobday. May 80, 27p
Contract EY-76-C-21-8055

An evaluation of the process requirements resulting from changing the Hydrane process from a two-stage hydrogenation to a single-stage hydrogasification process was undertaken by the Dravo Corporation for the Morgantown Energy Research Center, US Department of Energy, Morgantown, and West Virginia. Hydrogenation is the reaction of coal with hydrogen to produce gaseous and/or liquid products. Hydrogasifiation is the gasification of coal by direct reaction with hydrogen to produce gaseous products only. The present single-stage process scheme has further developed hydrogasification to incorporate rapid heating of fine coal particles (70%, -200 mesh) to the reaction temperature (1600 to 2000 exp 0 F). The heating rate has been estimated to be in excess of 1 x 10 exp 60 K per second. The combination of the two foregoing operations, i.e., rapid heating of the particle in an atmosphere of hydrogen, results in devolatilization of the coal particles and rapid reaction of devolatilized hydrocarbons with hydrogen. This process has also been termed flash hydropyrolysis. The advantages which accrue to this process are described. A conceptual plant design study wherein the economics of the Rocketdyne hydrogasification process can be evaluated is needed. Should the economics of the system prove to be competitive with other processes, then an integrated PDU should be designed and built for further experimentation. The process chemistry having been proven, it remains to accentuate process design and hardware development. (ERA citation 05:021606)

DOE/TIC-11156 PC **A02/MF A01**
Energy Research and Development Administration, Laramie, WY. Laramie Energy Research Center.
Accelerated Oil Shale In Situ Research: A Proposal for Acceleration of the In Situ Oil Shale Gasification Program.
Jan 76, 14p

It is proposed that the Paraho Oil Shale Demonstration Project, located at the Anvil Points facility near Rifle, Colorado, be contracted by ERDA to accelerate investigation of process variables as part of the oil shale gasification program of the Laramie Energy Research Center. These process variables are concerned with optimizing the quality and quantity of gas and liquid products obtained from retorting oil shale. The total funding requested for the proposed contract program is $1.308 million for a 7-month program of work. The surface oil-shale retorting facilities at Anvil Points can be efficiently and economically utilized in LERC's present 5-year program to effect an estimated $5.3 million savings in total program cost and an acceleration of the research program by at least 2 years. (ERA citation 05:021809)

FE-2708-8 PC **A02/MF A01**
Pennsylvania State Univ., University Park. Coll. of Earth and Mineral Sciences.
Stability of SiC, Si sub 3 N sub 4 , Si sub 2 N sub 2 O, SIALON and Chromium Oxide-Containing Refractories in Coal Gasification Environments. Second Annual Report, September 1, 1978-August 31, 1979.
A. Muan. 15 Oct 79, 24p
Contract EF-77-S-01-2708

The main conclusions of this work are as follows: (1) the corrosive action of coal-ash slags on SiC refractories is caused mainly by the reduction-oxidation reaction between SiC and the iron oxide component of the slag. (2) The rate of attack on SiC by coal-ash slag is critically dependent on temperature, i.e. whether or not the SiC-slag interface is above or below the solidus temperature of the silicates involved (as a first approximation selected compositions in the system CaO-FeO-Al sub 2 O sub 3 -SiO sub 2). This temperature is approx. 1100 exp 0 C. (3) Studies of equilibrium relations in selected chromium oxide-containing silicate systems have established the low solubility of Cr sub 2 O sub 3 -containing refractory phases in silicate melts. The solubility of these phases in silicate melts increases drastically, however, at extremely low oxygen pressures, under which cnditions a substantial fraction of the chromium is present in the silicate liquid as a Cr exp 2+ . The oxygen pressures at which this situation prevails, however, are somewhat lower than those prevailing in coal gasification atmospheres. (ERA citation 05:021609)

LETC-1761-15/1 PC **A06/MF A01**
Wyoming Univ., Laramie.
Mathematical Modeling of Oil Shale Retorting.
J. H. George, and H. G. Harris. Dec 79, 102p
Contract AS20-79LC01761

In the horizontal retorting model, a scheme where there is an oil buildup and then at various times the oil is pushed down to account for the dripping, seems to be a better explanation than another scheme. In the optimization studies, the projected oil yield was considerably enhanced by increasing the heat input from the burner to about 10 exp 6

Btu/h. Oil recovery as percent of Fischer assay could be increased to the 75 to 80% level, with the upper limit determined by the particle sizes used. Other factors, such as leaving the burner on for a longer time, did not change the yield as significantly as raising the burner rate. Run 17 was conducted with steam injection instead of gas recycle. The predicted oil yield was improved here also by the higher burner rate. Experimentally achieving higher burner rates is a problem with the current 150-ton retort configuration and burner arrangement. Higher firing rates result in a back pressure buildup and possible extinction of the flame, necessitating a costly reloading of the retort. Accordingly, a suggestion has been simulated in which the burner is stepped up at a prescribed rate until the 10 exp 6 Btu/h rate is achieved. This approach may be possible experimentally. Calculations indicate in this case the oil yield does come up to the 75% of Fischer assay level. (ERA citation 05:021810)

7C. Organic Chemistry

AD-A085 369/7 PC **A02**/MF **A01**
Rockwell International Canoga Park CA Rocketdyne Div
Introduction of Functional Groups into Some Cholorofluorocarbon Ethers.
Carl J. Schack, and Karl O. Christe. 6 Jun 79, 5p AFOSR-TR-80-0387
Contract F49620-77-C-0038
Pub. in Jnl. of Fluorine Chemistry, v14 p519-522 1979.

No abstract available.

AD-A085 511/4 PC **A06**/MF **A01**
Rockwell International Canoga Park CA Rocketdyne Div
Inorganic Reactants for Synthesis of Novel Fluorocarbon Derivatives.
Final technical rept. 15 Mar 77-14 Mar 80,
Carl J. Schack, and Karl O. Christe. 13 May 80, 119p RI/RD80-152, AFOSR-TR-80-0450
Contract F49620-77-C-0038

Several different fluorocarbon fluids containing the SF5O- and CF3O- groups have been prepared using fluoroolefins and either SF5OOSO2F or CF3OOSO2F. In addition the fluorocarbon ethers, SF5OC2F4OSO2F and CF3OC2F4OSO2F, and several of their derivatives were prepared and characterized. Chlorine fluorosulfate and bromine fluorosulfate were shown to have wide utility in the displacement of halide from fluorocarbon halides (R sub f X) resulting in the formation of fluorocarbon fluorosulfates. The R sub f SO3F compounds are readily converted to derivatives such as acid fluorides, acids, etc., and in this way functionality is introduced into relatively inert fluorocarbons. A new method was discovered for the introduction of fluorine into an aromatic ring with retention of aromaticity, using NF4BF4 in HF solution. Also when the arene is already highly fluorinated, it was shown that a slower addition of fluorine occurred to give cyclohexadienes and cyclohexenes.

AD-A085 523/9 PC **A02**/MF **A01**
Illinois Univ At Chicago Circle Dept of Chemistry
High Energy Materials. New Preparation Approaches to Nitro and Nitroso Derivatives.
Annual rept. 1 Apr 79-31 Mar 80,
J. H. Boyer. 1 Jun 80, 16p
Contract N00014-79-C-0353

Progress on the preparation of dinitro-dicyanoethylene from diaminomaleo-nitrile, from dicyanofuroxan, from dicyanoglyoxime nd from nitroacetonitrile is discussed. (Author)

PAT-APPL-6-132 595 PC **A02**/MF **A01**
Department of Agriculture, Washington, DC.
Ketose Sugars.
Patent Application,
Kevin B. Hicks. Filed 21 Mar 80, 16p PB80-191448
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention relates to a process for making ketose sugars and, more specifically, to a process for converting in high yield aldose sugars to ketose sugars.

PATENT-4 196 149 Not available NTIS
Department of Agriculture, Washington, DC.
Ternary Salts of Tris(aminomethyl)phosphines and Their Oxides.
Patent,
Arlen W. Frank, Donald J. Daigle, and Russell M. H. Kullman. Filed 29 Nov 78, patented 1 Apr 80, 6p PB80-190390, PAT-APPL-964 854
Supersedes PB-290 546.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

Novel ternary salts of tris(aminomethyl)phosphines and their oxides having the formula (R2NH(+)CH2)3P(0)n3X(-), wherein R is hydrogen, an alkyl radical having from 1 to 6 carbon atoms or an aryl radical, n is an integer from 0 to 1, and X is a halogen, are prepared by the reaction of a hydrohalic acid, HX, with various nitrogen- and phosphorus-containing compounds including tris(aminomethyl)phosphines and their oxides, tris(N-carbalkoxylaminomethyl)phosphines oxides, and 1,3,5-triaza-7-phosphaadamantane and its 7-oxide.

PATENT-4 199 460 Not available NTIS
Department of Agriculture, Washington, DC.
Fatty Acid-Derived Lubricants and Additives.
Patent,
Gene Sumrell, Robert R. Mod, Frank C. Magne, and Ronald E. Koos. Filed 26 Sep 78, patented 22 Apr 80, 5p PB80-190416, PAT-APPL-945 977
Supersedes PB-289 030.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

This invention relates to addition products of dialkyl-phosphorodithioic acid, hexachlorocyciopentadiene, or bromotrichloromethane to unsaturated or epoxy fatty acid amides and esters. These products are useful as extreme pressure lubricants and additives.

PATENT-4 203 996 Not available NITS
Department of Agriculture, Washington, DC.
Synthetic Cephalotaxine Esters Having Anti-leukemic P388 Activity.
Patent,
Kenneth L. Mikolajczak. Filed 3 Jan 79, patented 20 May 80, 7p PB80-195217, PAT-APPL-6-000 738
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

Six acyl esters of cephalotaxine have been synthesized by ordinary and standard procedures, and all have demonstrated chemotherapeutic activity against leukemia of the strain P388 in animals.

7D. Physical Chemistry

AD-A084 850/7 PC **A02**/MF **A01**
National Bureau of Standards Washington DC Surface Science Div
Infrared Spectra of Methyl Isocyanide Chemisorbed on Rhodium.
Technical rept.,
R. R. Cavanagh, and John T. Yates, Jr. May 80, 9p Rept no. TR-16
Contract N00014-80-F-0008

The chemisorption of CH3NC on dispersed Rh supported on Al2O3 has been investigated using transmission in frared spectroscopy. Evidence for the chemisorption of undissociated CH3NC is presented. It is shown that at 300K the isomerization of CH3NC to CH3CN does not occur on Rh. The spectra obtained for adsorbed CH3NC suggest an analogous chemistry of the Rh surface sites to that found in organometallic chemistry.

AD-A084 851/5 PC **A02**/MF **A01**
National Bureau of Standards Washington DC Surface Science Div
Temperature Effects on the Infrared Spectrum of Chemisorbed CO.
Technical rept.,
P. R. Antoniewicz, R. R. Cavanagh, and John T. Yates, Jr. May 80, 21p Rept no. TR-17
Contracts N00014-80-F-0008, N00014-79-F-0008

The temperature dependence of the infrared spectrum of CO chemisorbed on Rh supported by Al2O3 has been measured. A shift in the CO stretching frequency of 1.4 x 1/100 cm K-1 to higher frequency is observed on cooling. An electrodynamic model of the surface interactions is presented. The model accounts for both the magnitude and direction of the observed shift. (Author)

AD-A084 852/3 PC **A02**/MF **A01**
National Bureau of Standards Washington DC Surface Science Div
Site Distribution - Studies of Rh Supported on Al2O3 - An Infrared Study of Chemisorbed CO.
Technical rept.,
R. R. Cavanagh, and John T. Yates, Jr. May 80, 21p Rept no. TR-18
Contracts N00014-80-F-0008, N00014-79-F-0008

Using infrared spectroscopy, chemisorbed CO has been employed as a surface probe to observe differences in Rh site distributions on Al2O3-supported Rh. It has been found that higher loadings of Rh lead to Rh site distributions resembling those found on Rh(111) single crystals, whereas low Rh loadings produce isolated Rh sites preferentially. The isolated Rh sites yield infrared spectra characteristic of a species, Rh(CO)2. Chemisorption of oxygen onto the CO-covered surface effectively eliminates crystalline Rh sites, leaving only the isolated Rh sites which maintain their bonding to CO as seen by infrared spectroscopy. Estimates of the infrared extinction coefficient for Rh(CO)2 have been made. The results are consistent with data from other laboratories which indicate that Rh is in a Rh delta + oxidation state. (Author)

AD-A084 853/1 PC **A02**/MF **A01**
National Bureau of Standards Washington DC Surface Science Div
Hydrogen Spill-over on Alumina - A Study by Infrared Spectroscopy.
Technical rept.,
R. R. Cavanagh, and J. T. Yates, Jr. May 80, 16p Rept no. TR-19
Contracts N00014-80-F-0008, N00014-79-F-0008

Infrared spectroscopy has been used to monitor the exchange of D2(g) with OH groups chemisorbed on Al2O3. It has been shown that near 300K, the rate of the exchange process is rapid in the presence of supported Rh particles on the Al2O3. A qualitative model for hydrogen 'spillover' is presented in which dissociative adsorption of dihydrogen by the metal is a key step. It is shown that CO chemisorption on the supported Rh leads to a marked reduction in the 'spillover' rate due to site blockage on the Rh. This is consistent with recent studies of behavior of the CO and H coadsorbed on Rh(111). (Author)

AD-A085 264/0 PC **A06**/MF **A01**
Cornell Univ Ithaca NY School of Applied and Engineering Physics
Chemical Laser Systems.
Final rept. 1 Apr 77-31 Mar 79,
Terrill A. Cool. 31 Mar 79, 106p AFOSR-TR-80-0423
Grant AFOSR-77-3258

The major effort undertaken was a thorough spectroscopic study of the products of reactions of yttrium and scandium atoms with halogen molecules. These studies have shown that chemiluminescence for these reaction systems does not originate from electronically excited monohalide molecules as suggested by previous investigators, but instead arises from electronically excited metal dihalide molecules, MX2*. Excitation spectra from the monohalides of yttrium and scandium were recorded with the laser-induced fluorescence method. Spectroscopic constants and radiative lifetimes were determined for several previously unobserved electronic states. An evaluation of the chemiluminescence from chemical reactions initiated in PH3/N2O mixtures was performed. (Author)

AD-A085 311/9 PC **A02**/MF **A01**
Purdue Univ Lafayette IN Dept of Chemistry

X-Ray Photoelectron Spectroscopic Studies of Electrode Surfaces.
Final rept. 14 Jan 77-14 Dec 79,
Nicholas Winograd. 15 Apr 80, 19p AFOSR-TR-80-0420
Grant AFOSR-76-2974

Emphasis is on the development of x-ray photoelectron spectroscopy (XPS) in characterizing electrochemical reaction mechanisms. The advantages of XPS to the study of electrode surfaces are the depth sensitivity to most metals is quite high with the escape length of the emitted electrons occurring only through 10-20A of the sample surface. The measured binding energies are sensitive to the oxidation state of the metal atom. Under potential deposition for silver and copper on platinum electrodes have been examined by both XPS and Auger spectroscopy. A combination of XPS and secondary ion mass spectrometry (SIMS) was designed and connected with two satellite vacuum systems via a set of magnetically driven transfer device. This configuration allowed each technique to have its own chamber for electrode preparation. High energy ion beams were investigated for use in the ion implantation of various substrates aimed at creating new materials with unusual properties. Initial studies were focused on use of copper, silver, and gold ion beams directed toward silicon dioxide and graphite. (Author)

AD-A085 314/3 PC **A18/MF A01**
Illinois Univ At Urbana-Champaign Coordinated Science Lab
Nitrogen Isoelectronic Traps in Gallium Arsenide Phosphide and Aluminum Gallium Arsenide.
Doctoral thesis,
Donald James Wolford, Jr. Nov 79, 404p Rept nos. R-862, UILU-ENG-78-2255
Contract N00014-79-C-0424

The results presented here form the basis for reinterpreting N-trap luminescence in GaAs sub 1-x P sub x and Al sub x Ga sub 1-x As. Previously the luminescence of these centers in ternary alloys was attributed to NN pairs. For the isolated N center, only one bound state was identified, and that corresponded to the A-line in GaP (or AlAs). On the basis of the new data, it is now clear that dominant emission (termed N sub x) is due not to NN pairs but to isolated N and previously ignored phonon coupling. Furthermore, in GaAs sub 1-x P sub 1-x it is found an additional shallow bound state associated largely with the gamma sub 1 band minimum.

AD-A085 324/2 PC **A03/MF A01**
SRI International Menlo Park CA
Studies in Aromatic and Amine Nitration.
Final rept. 3 May 76-30 Nov 79,
David S. Ross, and William Blucher. 20 May 80, 50p ARO-13831.3-CX
Contract DAAG29-76-C-0040

Nitrogen tetroxide (N2O4) reacts very slowly with benzene. Only after reaction at high temperature or for very long periods is some nitration observed. It is reported here on nitrations in N2O4 systems that are rapid at 0 C and appears to represent a new route to aromatic nitration. As it will be discussed, the rates of aromatic nitration as well as the distribution of isomers in products from the system are significantly different from those obtained classically in mixed acid systems.

AD-A085 333/3 PC **A02/MF A01**
Yale Univ New Haven CT Dept of Engineering and Applied Science
Internal Energy Relaxation Rates from Seeded Supersonic Beams with a Monatomic Host Gas,
C. G. Michael Quah. 27 Oct 78, 6p AFOSR-TR-80-0364
Grant AFOSR-75-2863
Pub. in Chemical Physics Letters, v63 n1 p141-144, 1 May 79.

No abstract available.

AD-A085 360/6 PC **A02/MF A01**
Virginia Univ Charlottesville Dept of Chemistry
Excited-State Acid-Base Reactions of Dicyanobis(2,2'-bipyridine)ruthenium(II) and Dicyanobis(1,10-phenanthroline)ruthenium(II),
Steven H. Peterson, and J. N. Demas. 31 Oct 78, 9p AFOSR-TR-80-0388
Grant AFOSR-78-3590
Pub. in Jnl. of American Chemical Society, v101 n22 p6571-6577, 24 Oct 79.

No abstract available.

AD-A085 363/0 PC **A02/MF A01**
Texas Univ At Austin Dept of Chemistry
Ground States of Molecules.55. MINDO/3 Study of Rearrangements of C4H7 Radicals,
Michael J. S. Dewar, and Santiago Olivella. 6 Nov 78, 7p AFOSR-TR-80-0371
Grant AFOSR-75-2749
Pub. in the Jnl. of the American Chemical Society, v101 n17 p4958-4962, 15 Aug 79.

No abstract available.

AD-A085 370/5 PC **A02/MF A01**
United Technologies Research Center East Hartford CT
Electronic Structure and Photoabsorption of the Mercury Dimer Ion,
H. H. Michels, R. H. Hobbs, and J. W. D. Connolly. 21 Sep 79, 6p UTRC/922853, AFOSR-TR-80-0355
Contract F49620-77-C-0064
Pub. in Chemical Physics Letters, v68 n2,3 p549-553, 15 Dec 79.

No abstract available.

AD-A085 371/3 PC **A05/MF A01**
AeroChem Research Labs Inc Princeton NJ
High Temperature Flow Tubes. Generation and Measurement of Refractory Species,
Arthur Fontijn, and William Felder. 1979, 91p AFOSR-TR-80-0328
Contracts F44620-76-C-0108, F49620-77-C-0033
Pub. in Reactive Intermediates in the Gas Phase, p59-149 1979.

No abstract available.

AD-A085 372/1 PC **A02/MF A01**
Yale Univ New Haven CT Dept of Engineering and Applied Science
Time Development of SERS from Pyridine, Pyrimidine, Pyrazine, and Cyanide Adsorbed on Ag Electrodes during an Oxidation-Reduction Cycle,
Ralf Dornhaus, Marshall B. Long, Robert E. Benner, and Richard K. Chang. 24 Jul 79, 24p Rept no. TR-8
Contract N00014-76-C-0643
Pub. in Surface Science, v93 p240-262 1980.

No abstract available.

AD-A085 377/0 PC **A02/MF A01**
Utah Univ Salt Lake City Dept of Materials Science and Engineering
Polar Bonds and Polarizability in Conformational Energy Calculations: Application of a Polarization Model to Alkyl Halides,
Richard H. Boyd, and Laya Kesner. 20 Aug 79, 14p ARO-14913.1-C
Grant DAAG29-77-G-0197
Pub. in Jnl. of Chemical Physics, v72 n3 p2179-2190, 1 Feb 80.

No abstract available.

AD-A085 436/4 MF **A01**
Texas Univ At El Paso Dept of Electrical Engineering
Computerized Method for the Generation of Molecular Transmittance Functions in the Infrared.
Final rept.,
Joseph H. Pierluissi, and Ken Tomiyama. Apr 80, 195p ERADCOM/ASL-CR-80-0067-1
Contract DAAG29-79-C-0067
Availability: Microfiche copies only.

A study is made of two basically distinct methods normally used in the development of band models for the calculation of gaseous molecular transmittance in the infrared region. The first method consists of the determination of the 'empirical' transmittance function and the associated absorber and spectral parameters from measured or calculated transmittance spectra. The second method consists of the determination of the absorber and spectral parameters with an assumed 'analytical' transmittance function, using the same type of data. Computerized numerical techniques are presented in connection with the first method and a generalized transmittance function is adopted for the second method. Although the methodology is generally applicable to other gaseous species, it is specifically discussed in connection with the trace gases SO2, NO, NO2, and NH3. As a secondary effort a structural breakdown of the Lowtran code is presented for the purpose of incorporating the band models for the trace gases.

AD-A085 453/9 PC **A04/MF A01**
Rockwell International Anaheim CA Electronics Research Center
Multicolor Electrochromic DOT-Matrix Display Investigation.
Final rept. 1 Jul 79-31 Mar 80,
M. M. Nicholson, F. A. Pizzarello, and T. J. La Chapelle. Jun 80, 51p Rept no. C80-352/501
Contract N00014-79-C-0434

The feasibility of multicolor electrochromic dot-matrix displays based on lutetium diphthalocyanine was investigated on the premise that integrated matrix drive electronics for such devices will become available in several years. A 3 x 3-inch display panel with switchable 5 x 7-dot characters was attractive and clearly legible at 24 lpi. Viewing was hardly impaired when a metal mesh overlay simulating the appearance of matrix drive circuitry was placed in registry with the dot pattern. Color resolution and memory were demonstrated for adjacent red/green, blue/green, and red/blue areas in the matrix. Current and charge transients were recorded for constant-voltage pulses applied to areas representing 2 to 16 dots. Time constants of 10 to 20 ms were typical of the green-to-red electrochromic transition. An effective capacitance of approximately 1000 microform/sq cm arose from the electrochemical reaction of the dye film. Also associated with that process was an area resistance, usually less than 25 ohms.sq cm. Further development of multicolor electrochromic dot-matrix displays is recommended. (Author)

AD-A085 477/8 PC **A04/MF A01**
Naval Research Lab Washington DC
Detailed Atomic Neon LTE Emission Model and Stark Profiles for H-Like and He-Like Neon and Argon.
Final rept.,
Paul C. Kepple, and J. E. Rogerson. 25 Apr 80, 66p NRL-MR-4216, AD-E000 432

A neon LTE model based on actual atomic data and including a large number of excited levels and lines, especially in the He-like and H-like stages, is described. Results are given for line and continuum emissions vs. frequency. Stark broadened line profiles for H-like and He-like neon and argon atoms are presented as functions of frequency, electron temperature, and electron density.

AD-A085 492/7 PC **A02/MF A01**
California Univ Berkeley Dept of Chemistry
Chemiluminescence of Sulfur Monoxide in Solid Argon,
Yuan-Pern Lee, and George C. Pimentel. 23 May 78, 7p AFOSR-TR-80-0395
Grant AFOSR-78-3535
Pub. in Jnl. of Chemical Physics, v69 n7 p3063-3068, 1 Oct 78.

No abstract available.

AD-A085 495/0 PC **A03/MF A01**
Massachusetts Inst of Tech Cambridge Dept of Chemistry
Information-Theoretic Analysis of Energy Disposal in Heavy-Ion Transfer Reactions,
Y. Alhassid, R. D. Levine, J. S. Karp, and S. G. Steadman. 30 Apr 79, 27p AFOSR-TR-80-0398
Contract EY-76-C-02-3069, Grant AFOSR-77-3135
Pub. in Physical Review C, v20 n5 p1789-1813 Nov 79.

No abstract available.

AD-A085 496/8 PC **A02/MF A01**
California Univ Berkeley Dept of Chemistry

Diatomic Sulfur: Low Lying Bound Molecular Electronic States of Diatomic Sulfur,
William C. Swope, Yuan-Pern Lee, and Henry F. Schaefer, III. 22 Aug 78, 6p AFOSR-TR-80-0399
Grant AFOSR-78-3535
Pub. in Jnl. of Chemical Physics, v70 n2 p947-953, 15 Jan 79.

No abstract available.

AD-A085 497/6 PC **A02**/MF **A01**
California Univ Berkeley Dept of Chemistry
Chemiluminescence of Sulfur in Solid Argon,
Yuan-Pern Lee, and George C. Pimentel. 8 Aug 78, 9p AFOSR-TR-80-0400
Grant AFOSR-78-3535
Pub. in Jnl. of Chemical Physics, v70 n2 p692-698, 15 Jan 79.

No abstract available.

AD-A085 505/6 PC **A02**/MF **A01**
California Univ Berkeley Dept of Chemistry
Fluorescence and Thermoluminescence of N2O, CO, and CO2 in an Argon Matrix at Low Temperature,
J. Fournier, J. Deson, C. Vermeil, and George C. Pimentel. 4 Dec 78, 6p AFOSR-TR-80-0394
Grant AFOSR-78-3535
Pub. in Jnl. of Chemical Physics, v70 n12 p5726-5730, 15 Jun 79.

No abstract available.

AD-A085 522/1 PC **A02**/MF **A01**
Army Electronics Research and Development Command Fort Monmouth NJ Electronics Technology and Devices Lab
Transport in Thermally Grown Silica on Silicon.
Research and development technical rept.,
J. Bruce Wagner, Jr. Jan 80, 17p Rept no. DELET-TR-80-6

The oxidation kinetics of thermally grown silica on silicon are examined. It is concluded that the current kinetic equations do not agree with the proposed defect models for transport through silica. Suggestions for additional experiments are made. (Author)

AD-A085 562/7 PC **A02**/MF **A01**
University of Southern California Los Angeles Dept of Chemistry
Insertion of Dimethylsilylene into O-H and N-H Single Bonds,
Tai-Yin Yang Gu, and William P. Weber. 22 May 79, 6p AFOSR-TR-80-0368
Grant AFOSR-79-3123
Pub. in Jnl. of Oganometallic Chemistry, v184 p7-11 1980.

No abstract available.

AD-A085 574/2 PC **A02**/MF **A01**
Frank J Seiler Research Lab United States Air Force Academy CO
Mass Spectral Fragmentation of a Novel Cyclooctane: 2,4-Dimethyl-7,7-Dinitro-1,3,5-Trioxacyclooctane.
Technical rept.,
Raymond R. McGuire, and Scott A.Shackelford. May 80, 12p Rept no. FJSRL-TR-80-0012

A novel cyclooctane containing structural features unique to both geminal polynitroalkanes and cyclic trioxane acetals afforded an initial electron impact fragmentation analogous to cyclic acetals. Only in the latter stages of the fragmentation pathway did specied appear that are characteristic of geminal polynitroaliphatic and nitroalkane molecules. (Author)

AD-A085 612/0 MF **A01**
Concentration Specialists Inc Andover MA
Validation of a Freezer Concept for a Desalination Unit.
Final rept. Jun 78-Oct 79.
Apr 80, 35p CEL-CR-80.011
Contract N68305-78-C-0021
Availability: Microfiche copies only.

Validation of a smooth-tube, indirect-contact freezer concept was conducted toward inclusion in the design of a modular 20,000 GPD freezing desalinator for use at Naval Advanced Bases. A 5000 GPD model freezing desalinator consisting of freezers, crystal growth tank, wash column, melter and refrigeration system was used to test several flow schemes and freezer configuration having either three or five concentric tube freezer elements. Simplicity in operating mode coupled with low pressure drop (low pumping costs) and high ice production rates (high heat transfer coefficients) were sought. (Author)

AD-A085 617/9 PC **A03**/MF **A01**
SRI International Menlo Park CA Molecular Physics Lab
High-Resolution Photofragment Spectroscopy of the Plus 1 Molecular Oxygen b Quartet Sigma (gerade minus)(v' = 3,4,5) - a Quartet Pi (ungerade)(V 7 = 3,4,5) First Negative System Using Coaxial Dye-Laser and Velocity-Tuned Ion Beams,
P. C. Cosby, J. -B. Ozenne, J. T. Moseley, and D. L. Albritton. 21 Feb 79, 35p AFOSR-TR-80-0365
Contract F49620-78-C-0107, Grant NSF-CHE77-00428
Pub. in Jnl. of Molecular Spectroscopy, v79 p203-235 1980.

No abstract available.

AD-A085 620/3 PC **A02**/MF **A01**
Ohio State Univ Research Foundation Columbus
Interfacial Cohesion: Adsorption at Grain Boundaries and its Effect on Decohesion.
Technical rept.,
J. P. Hirth. 1980, 13p Rept nos. OSURF-760222/784098, OSURF-TR-20
Contract N00014-75-C-0541
Pub. in Philosophical Transactions of the Royal Society of London, Series A, v295 p139-149 1980.

No abstract available.

AD-A085 623/7 PC **A02**/MF **A01**
Rhode Island Univ Kingston Graduate School of Oceanography
Ultraviolet Spectroscopic Study of Ferric Iron Solutions.
Technical rept.,
Mary F. Brown, and Dana R. Kester. 10 Sep 79, 6p
Contract N00014-76-C-0226
Pub. in Applied Spectroscopy, v34 n3 p377-380 1980.

No abstract available.

AD-A085 714/4 PC **A03**/MF **A01**
Army Armament Research and Development Command Aberdeen Proving Ground MD Chemical Systems Lab
Electrical Conductivity and Infrared Radiometry of Steam.
Special publication Jul 77-Sep 78,
Hugh R. Carlon. Apr 80, 34p ARCSL-SP-80006, AD-E410 262

In-house laboratory independent research investigations of molecular clustering in water vapor included careful measurements of the electrical and infrared radiometric properties of steam and steam-humidified air. These measurements showed that 10 to the 6th power to 10 to the 7th power ions per cubic centimeter are present in steam or in steam-generated water vapor compared to 100 to 300 ions per cubic centimeter in water vapor under normal ambient conditions. These data, combined with infrared spectral observations of steam, are giving new insights into the understanding of the vapor-liquid phase transition in water. The results are important in meteorology, weather and climatology, and they have military implications.

AD-A085 779/7 PC **A02**/MF **A01**
Frank J Seiler Research Lab United States Air Force Academy CO
Prediction of Oxidation Half-Wave Potentials by MNDO Calculations.
Interim rept.,
L. P. Davis, C. L. Hussey, L. A. King, and J. S. Wilkes. May 80, 15p Rept no. FJSRL-TR-80-0011

The MNDO method has been applied for the prediction of oxidation half-wave potentials of a series of aromatic compounds. A linear relation between HOMO energies and E1/2 in N-alkylpyridinium chloroaluminate melts was demonstrated. (Author)

AD-A085 808/4 PC **A03**/MF **A01**
Aerospace Corp El Segundo CA Aerophysics Lab
Absolute Rate Coefficients for F + H2 and F + D2 at T = 295 K.
Interim rept.,
Raymond F. Heidner, III, Jerry F. Bott, Carrol E. Gardner, and James E. Melzer. 1 May 80, 30p
TR-0080(5606)-1, SD-TR-80-1
Contract F04701-79-C-0080

The rate coefficients for the F + H2 and F + D2 reactions were determined to be (1.8 plus or minus X 10 to the 13th power and (9.5 plus or minus 1.7) X 10 to the 12th power cm3/mol-sec, respectively. The absolute values and the resultant ratio of H-atom to D-atom abstraction of 1.92 + or minus 0.23 are in agreement with earlier determinations. Fluorine atoms were generated under isothermal conditions in excess argon by means of the infrared multiphoton dissociation of SF6. The reaction between F and H2(D2) was monitored by means of the time-resolved infrared emission from HF subscript(DF subscript). The validity of the experimental method is discussed. (Author)

ANL-CEN-RSD-80-1 PC **A02**/MF **A01**
Argonne National Lab., IL.
Tables of Thermodynamic Functions for Gaseous Thorium, Uranium, and Plutonium Oxides.
D. W. Green. Mar 80, 20p
Contract W-31-109-ENG-38

Measured and estimated spectroscopic data for thorium, uranium, and plutonium oxide vapor species have been used with the methods of statistical mechanics to calculate thermodynamic functions. Some inconsistencies between spectroscopic data and some thermodynamic data have been resolved by recalculating delta H exp 0 /sub f/ (298.15 exp 0 K) values for the vapor species of these oxides. Evaluation of the uncertainties in data, methods of estimating molecular parameters, and effects of assumptions have been discussed elsewhere. The tables of thermodynamic functions that were reported earlier have been revised principally because the low-frequency vibrational modes of UO sub 2 and UO sub 3 have now been measured. These new empirical data resulted in changes in the electronic contributions to the calculated thermodynamic functions of UO sub 2 and the estimated vibrational contributions for PuO sub 2 . In addition, some minor changes have been made in the methods of calculation of the electronic contributions for all molecules. (ERA citation 05:021384)

CONF-7910138-2 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Kinetic Model for Predicting the Concentrations of Active Halogen Species in Chlorinated Saline Cooling Waters.
M. H. Lietzke, and W. R. Haag. 1979, 13p
Contract W-7405-ENG-26
Conference of chlorination: environmental impact and health effects, Colorado Springs, CO, USA, 28 Oct 1979.

A kinetic model for predicting the composition of chlorinated water discharged from power plants using fresh water for cooling was previously reported. The model has now been extended to be applicable to power plants located on estuaries or on the seacoast where saline water is used for cooling purposes. When chloride is added to seawater to prevent biofouling in cooling systems, bromine is liberated. Since this reaction proceeds at a finite rate there is a competition between the bromine (i.e., hypobromous acid) and the added chlorine (i.e., hypochlorous acid) for halogenation of any amine species present in the water. Hence not only chloramines but also bromamines and bromochloramines will be formed, with the relative concentrations a function of the pH, temperature, and salinity of the water. The kinetic model takes into account the chemical reactions leading to the formation and disappearance of the more important halamines and hypohalous acids likely to be encountered in chlorinated saline water. (ERA citation 05:021204)

CONF-791103-89 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.

Scientometric Study of IAEA Activation Analysis Conferences.
W. S. Lyon. 1979, 6p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

Multiple speakers at three IAEA conferences on NAA in Life Sciences are analyzed and compared with other conferences; results indicate that these NAA conferences are about as open for participation as any of the other conferences. (ERA citation 05:021540)

CONF-791117-22 PC **A02/MF A01**
Oak Ridge National Lab., TN.
Acid-Compensated Multiwavelength Determination of Uranium in Process Streams.
D. T. Bostick. 1979, 8p
Contract W-7405-ENG-26
ANS topical conference, Kiawah Island, SC, USA, 26 Nov 1979.

Uranyl absorbance was measured in the presence of 0.02-5M HNO sub 3 to determine the effect of nitric acid concentration on the absorbance of uranium in the concentration range of 20 to 200 g/l. The uranyl absorbance was found to be primarily the result of three uranyl species: UO sub 22+ , UO sub 2 NO sub 3+ and a uranyl dimer. The concentration of HNO sub 3 determines the relative concentration of each of these uranyl cations and, hence, their contribution to the total absorbance. Because UO sub 22+ and UO sub 2 NO sub 3+ are the major uranyl species in streams containing excess acid (0.5-5M HNO sub 3), the absorbance at 416 and 426 nm is used to simultaneously calculate the total uranium and nitrate concentration in a stream to within 5% and 0.5 molar units, respectively. The uranyl absorbance in acid deficient aqueous streams (0.02 to 0.5M HNO sub 3) is due primarily to the absorbance of UO sub 22+ and the uranyl dimer. As a result the absorbance at 416 and 426 nm can be used to simultaneously calculate the total uranium and hydrogen ion concentration in samples to within 3% and 0.2 molar units, respectively. (ERA citation 05:020203)

CONF-800301-6 PC **A02/MF A01**
Oak Ridge National Lab., TN.
Calculation of Electric Field-Induced Detachment Rate of Electrons from Mononegative Ions; Relevance to Gaseous Dielectrics.
H. C. Schweinler, and L. G. Christophorou. 1980, 12p
Contract W-7405-ENG-26
International symposium on gaseous dielectrics, Knoxville, TN, USA, 9 Mar 1980.

This model for the mononegative atomic or molecular ion in its effect on the most loosely bound electron is a spherical square well (constant positive inner potential within a sphere of radius r sub 0 and zero potential outside). From it we have calculated by quantum mechanics the emission rate w/ sub nu lm/ of electrons from the nu /sup th/ excited state (of orbital angular momentum and magnetic quantum numbers l and m and energy E/sub nu l/ < 0) under the influence of a constant electric field F. The calculation is conceptionally simple (involving time-dependent perturbation theory) but technically complicated (requiring an eleven-fold integration), and leads to a surprisingly simple final expression. The relevance of our calculations to gaseous dielectrics is discussed. (ERA citation 05:021386)

COO-10514-2 PC **A02/MF A01**
Kansas State Univ., Manhattan. Dept. of Physics.
Electron Transfer in Ion-Atom Collisions.
C. D. Lin. 1979, 8p CONF-790950-3
Contract AC02-79ER10514
International seminar on ion-atom collisions (ISIAC VI), Tokai-mura, Japan, 6 Sep 1979.

Recent theoretical development in the understanding of electron transfer processes is reviewed. K-K electron transfer processes are studied for projectiles (nuclear charge Z/sub B/) and targets (nuclear charge Z/sub A/) in which Z/sub A/ and Z/sub B/ range from Z/sub A/ much greater than Z/sub B/ to Z/sub A/ approx. = Z/sub B/, over the energy range 0.1 < v/v/sub e/ < 2. (ERA citation 05:021387)

COO-1617-63 PC **A03/MF A01**
Nebraska Univ., Lincoln. Dept. of Chemistry.

High Energy Halogen Atom Reactions Activated by Nuclear Transformations. Progress Report, February 15, 1979-February 14, 1980.
E. P. Rack. Feb 80, 41p
Contract FY-76-S-02-1617

The program consists of six interrelated areas: (1) Reactions of iodine with alkenes and alkynes activated by radiative neutron capture and isomeric transition in low pressure gaseous systems employing additives and rare gas moderators, high pressure, and liquid systems. Special attention was given to the reactivity of excited complex formation and structural effects of electrophilic iodine attack on various pi-bond systems. (2) The gas-to-condensed phase transition in halogen high energy chemistry. Current interest involves the study of caging effects of an ice lattice on recombination reactions involving neutron-irradiated frozen aqueous solutions of halogenated organic and biochemical solutes in order to learn more about kinetic energy effects, halogen size, solute molecule size, steric effects and hydrogen bonding within an ice lattice cage. (3) Systematics of halogen hot atom reactions. The reactions of /sup 80m/Br, exp 80 Br, /sup 82m/Br + exp 82 Br, exp 82 Br, exp 82 Br, exp 128 I, exp 130 I, and /sup 130m/I + exp 130 I activated by radiative neutron capture or isomeric transition in hydrocarbons and halo-substituted alkanes in low pressure and high pressure gaseous systems employing additives and rare gas moderators are currently being studied. (4) Mathematical and computer simulation studies of caging events within an ice lattice are being investigated. (5) At Brookhaven National Laboratory, cyclotron-produced chlorine and fluorine hot atoms substitution reactions with molecules possessing a single chiral center are under investigation to determine the role of hot atom kinetic energy, halogen atom, enantioner structure, steric effects and phase on the extent of substitution by retention of configuration or by Walden inversion. (6) The applications of high energy techniques and concepts to neutron activation analysis for trace element determinations in biological systems was continued. (ERA citation 05:020997)

DOE/CS/35305-T2 PC **A04/MF A01**
Solar Turbines International, San Diego, CA.
Development of Polyimide Materials for Use in Solar Energy Systems. Final Report, August 1, 1978-July 31, 1979.
A. L. Wilcoxson, U. A. Sorathia, and J. Gagliani. 1980, 63p
Contract EM-78-C-04-5305

A program to optimize and characterize improved insulation materials for solar energy systems is described. Two separate and distinct products have been studied, a lightweight flexible insulating foam and a high density, rigid, load bearing insulating foam. These products are derived from a polyimide resin, the formulations and processes for which were developed under NASA-JSC sponsored programs. These materials are non-burning and do not emit measurable quantities of smoke or toxic by-products. Candidate resins were selected on the basis of cost, expected foam insulating and weatherability properties and ease of production. Critical characterization parameters were established for the flexible insulating foam in the form of environmental exposure resistance, thermal conductivity and hydrolytic stability. Studies initiated to improve the exposure resistance included additive studies, using reinforcements and UV absorbers, and postcure and densification studies. Optimum resin formulations, foam densities and foam structures were identified on the basis of the exposure, thermal conductivity, and microwave testing. Two candidate materials were selected and fully characterized for physical and thermal properties. This resulted in the selection of a final candidate material. The rigid foam was optimized through a glass reinforcement and process parameter study. This work was characterized on the basis of low cost, ease of production and the critical property requirement of compressive strength. The result of these studies was an optimized glass strand/microballoon reinforced foam which was then fully characterized for physical and thermal properties. Samples of both the flexible and rigid polyimide insulating materials were then prepared and submitted to DOE. (ERA citation 05:022224)

DOE/ER/04216-6 PC **A02/MF A01**
Chicago Univ., IL. Dept. of Chemistry.

Synthesis, Chemistry and Catalytic Activity of Complexes of Lanthanide and Actinide Metals in Unusual Oxidation States and Coordination Environments. Progress Report, February 1, 1979-January 31, 1980.
W. J. Evans. Oct 79, 12p
Contract AC02-77ER04216

The new synthetic and catalytic reactions involving lanthanide metals which were discovered in the first years of this project have been examined in more detail in the past year. Synthetic and catalytic model systems have been theoretically developed and experimental testing of these hypotheses is in progress. New techniques are being applied to the lanthanide metals to further elucidate the chemistry of these complexes. (ERA citation 05:020960)

DOE/ET/23033-12 PC **A02/MF A01**
Xerox Palo Alto Research Center, CA.
Defect States in Plasma-Deposited a-Si:H. Technical Progress Report, August-October 1979.
J. C. Knights. 11 Dec 79, 8p
Contract AC03-79ET23033

Raman and ESR measurements were used to study the atomic bonding and defect concentrations. Features are identified in the Raman spectra which can be attributed to configurations containing Si-Si, Si-As and As-As bonds. Features due to all three of these configurations were found to simultaneously exist, thus excluding a chemically ordered model of the bonding. However, the composition dependences of the features do not follow exactly a random bonding model either. The H bonding configurations were reflected in features at approx.2000 cm exp -1 in the Raman spectra. It was found that the H bonding changed dramatically in the As doping to 5% As alloying region. The ESR measurements indicated a low level of singly occupied defect states in all the samples studied. (ERA citation 05:022727)

FE-2019-T1 PC **A04/MF A01**
Montana Univ., Missoula.
Environmental Effects from Leaching of Coal Conversion by-Products. Final Report.
W. P. Van Meter, and R. E. Erickson. Jul 79, 71p
Contract EX-76-C-01-2019

The gasification of coal will almost surely be used to supplement supplies of natural gas. The gasification process will be quite different, chemically, from the traditional combustion of coal for power generation, and will produce solid wastes (ash, slag, char) that may be able to cause environmental damage through leaching of toxic elements by precipitation or groundwater. Specimens of solid wastes from existing gasification plants and pilot plants have been examined by laboratory column leaching techniques to determine the available amounts of twelve of the more common or more toxic elements. Measurements in all cases (except fluoride) were made by atomic absorption spectrometry. For the elements considered to be toxic, it was rare to observe concentrations greater than those permitted by the EPA in drinking water. In some cases the specimens were produced by facilities that represented only portions of the complete gasification plant design. It is recommended that surface land-fill not be used as a final disposal method, and that any full-scale installations be required to supply specimens for leachability testing covering each class of feedstock used. (ERA citation 05:021678)

INIS-mf-5387 PC **A04/MF A01**
Stuttgart Univ. (Germany, F.R.).
Nuclear Spin Resonance Study of the Niobium-Hydrogen System.
S. Dais. 14 Jul 78, 74p
In German.Thesis.
U.S. Sales Only.

In this paper a study of the NbH-system (H concentration 4at%, 6at%, 8at%) in the single and binary phase region is presented. In order to separate the two relaxation rates occuring simultaneously is the (alpha + beta)-phase region, a computer controlled itterative experimental method has been developed. Evaluation of the longitudinal relaxation rates lambda1 of H and Nb gives the following results: 1) The activation energy for hydrogen diffusion in the alpha -phase

is independent of temperature. 2) As in the alpha -phase, the H-diffusion in the beta -phase cannot be described by a single activation energy. Below 305 exp 0 K EA = 0.22 eV and tau sub 0 = 1.6 10 exp -12 s in the case of NbH sub 0 . sub 04 and NbH sub 0 . sub 08 , and EA = 0.24 eV and tau sub 0 = 4.5 10 exp -13 for NbH sub 0 . sub 06 ; above 305 exp 0 K the activation energy increases up to EA = 0.44 eV (NbH sub 0 . sub 06 : EA = 0.51eV). 3) The H-relaxation rate angular dependence is completely described by the proton configuration proposed by Somenkov, where the proton are located on interstitial point of the host lattice (super structure) 4) Based on the temperature dependent partition of the protons between the alpha and beta phase, the NbH system phase diagram can be determined in the concentration range 0.5 at% - 0.6at% (H/Nb) (220 exp 0 K <=T <= 350 exp 0 K). For the proton solution enthalpy in the beta -phase values between 0.12 eV and 0.15 eV are obtained for the samples under study. In contrast to the lambda1 measurements (relaxation in a strong magnetic field of about 10 exp 4 Oe) the interpretation of the lambda sub 13 data (relaxation in a weak field of a few Oe, rotating with the magnetization) is not clear. In both cases the relaxation rates are based on the same metal physical properties of the NbH system. (Atomindex citation 11:497878)

INP-967/PS PC **A06**/MF **A01**
Institute of Nuclear Physics, Krakow (Poland).
High Resolution Nuclear Magnetic Resonance Study of Molecular Motion in Solids and Liquid Crystals.
A. Jasinski. 1977, 101p
In Polish.
U.S. Sales Only.

Application of high resolution NMR techniques to study the molecular motion in solids and liquid crystals has been presented. A theory of NMR spectra and a theory of relaxation have been developed for rapidly-rotated solids whose spectra are narrowed by internal motion. The effect of molecular motion on resolution of the multipulse NMR technique has been calculated in the case of /1 3 2; 1 3 tilde 2/ /1 2 3; 1 2 tilde 3/ sequence. It has been shown, that in both techniques the molecular motion is an important factor limiting the resolution. It has been also found, that rotating frame relaxation T sub(1rhoR) for the spinning sample may extend the information of the conventional Tsub(1rho) about the slow molecular motion. Multipulse NMR techniques have been used to investigate the molecular motion in the lamellar mesophase of some lyotropic liquid crystals. A new method of direct measurement of the order parameter S has been developed, based on the analysis of the multipulse spectra. Chemical shift tensors have been also measured for the CF sub 2 and CF sub 3 groups in CsPFO molecule. (Atomindex citation 11:495510)

JYFL-RR-1/79 PC **A02**/MF **A01**
Jyvaeskylae Univ. (Finland). Dept. of Physics.
Determination of Ion-Induced K-Shell Ionization Cross Sections by Comparison with Nuclear Coulomb Excitation.
A. Celler, J. Kantele, M. Luontama, and J. Zylicz. Feb 79, 13p
U.S. Sales Only.

A new method for the determination of cross sections for K-shell ionization of heavy atoms by charged particles is proposed. The method is based on a comparison of photon lines due to K x-rays and low-energy gamma -rays, the latter ones being produced in nuclear Coulomb excitation with accurately known cross sections. This procedure applies within a limited energy range to the study of targets comprising deformed even nuclei, but can also be extended to other targets having Z > or approximately 30. A test of the new technique has been carried out for Gd, W, Th and U natural targets irradiated by 4.75 MeV protons. For Th, also energies of 6.80 to 10.10 MeV were used. The results are briefly discussed with reference to those from other experiments and from various theoretical predictions. (Atomindex citation 11:495430)

KFTI-79-4 PC **A02**/MF **A01**
Akademiya Nauk URSR, Kharkov. Fiziko-Tekhnicheskii Inst.
Recovery of Implanted Atom Distribution by the Spectra of Ion Backscattering.
Yu. P Antuf'ev, V. V. Gann, and A. I. Zhukov. 1979, 9p
In Russian.
U.S. Sales Only.

Suggested is the algorithm to find the implanted atom profile with the help of experimental backscattering spectra of light ions. The algorithm is based on the numerical solution of the intergral equation by the regularization method. The effect of struggling is investigated and test calculations of profiles of Ni, Al and Be atoms bedding are performed. (Atomindex citation 11:495469)

LA-8267-MS PC **A11**/MF **A01**
Los Alamos Scientific Lab., NM.
Electron Excitation Collision Strengths for Positive Atomic Ions: A Collection of Theoretical Data.
A. L. Merts, J. B. Mann, W. D. Robb, and N. H. Magee, Jr. Mar 80, 227p
Contract W-7405-ENG-36

This report contains data on theoretical and experimental cross sections for electron impact excitation of positive atomic ions. It is an updated and corrected version of a preliminary manuscript which was used during an Atomic Data Workshop on Electron Excitation of Ions held at Los Alamos in November 1978. The current status of quantitative knowledge of collisional excitation collision strengths is shown for highly stripped ions where configuration mixing, relativistic and resonance effects may be important. The results show a reasonably satisfactory state for first-row isoelectronic ions and indicate that a considerable amount of work remains to be done for second-row and heavier ions. (ERA citation 05:021388)

NVO-1603-2 PC **A07**/MF **A01**
Illinois Univ. at Chicago Circle. Dept. of Physics.
Photolytic Production of Excited States and Collisional Phenomena for Laser Fusion Applications. Annual Report, 11 September 1978-10 September 1979.
R. T. Hawkins, and C. K. Rhodes. Dec 79, 137p
DOE/DP/40025-2
Contract AS08-78DP40025

Several studies involving the development and use of high spectral brightness rare gas halogen sources are presented. At 248 nm, a source whose spectral width and beam divergence approach the fundamental limits of physical optics is described. This device is clearly scalable to terawatt power levels. Such high brightness devices can be readily utilized to examine a broad range of atomic and molecular phenomena pertinent to laser development. These studies include state specific kinetic processes, excited state photoionization, electron collisional mechanisms, and a variety of multiquantum processes. (ERA citation 05:021380)

N80-25613/4 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
An Experimental Investigation of Convection in a Fluid That Exhibits Phase Change.
D. E. Fitzjarrald. May 80, 28p NASA-TM-78277

Convection flows were systematically observed in a layer of fluid between two isothermal horizontal boundaries. The working fluid was a nematic liquid crystal, which exhibits a liquid-liquid phase change at which latent heat is released and the density changed. In addition to ordinary Rayleigh-Benard convection when either phase is present alone, there exist two types of convective motions initiated by the unstable density difference. When a thin layer of heavy fluid is present near the top boundary, hexagons with downgoing centers exist with no imposed thermal gradient. When a thin layer of light fluid is brought on near the lower boundary, the hexagons have upshooting centers. In both cases, the motions are kept going once they are initiated by the instability due to release of latent heat. Relation of the results to applicable theories is discussed.

N80-26124/1 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Thermodynamic Properties of Extended Hubbard Model with Strong Intraatomic Attraction and Arbitrary Electron Density.
S. Robaszkiewicz, R. Micnas, and K. A. Chao. Apr 80, 35p INPE-1726-NTE/158-REV
Revised.

A canonical transformation is used to derive an effective extended Hubbard Hamiltonian with intraatomic repulsion and Ising-type interatomic exchange interaction in an effective external magnetic field from the extended Hubbard model with intraatomic attraction. The absence of magnetic ordering in the original Hamiltonian is transformed into the condition of one quasiparticle per atom. In the strong intraatomic attraction limit, we can further derive from the transformed Hamiltonian an antiferromagnetic anisotropic Heisenberg Hamiltonian in an external field and with a given value of magnetization. A phase diagram of the charge ordered, the singlet superconducting, the mixed, and the nonordered phase is then obtained with the mean field approximation. The collective excitations are examined in the MFA states. For various special cases results reduce to the known results or the exact solutions.

PAT-APPL-6-005 942 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Process for Purifying Geothermal Steam.
Patent Application,
C. T. Li. Filed 24 Jan 79, 12p
Contract EY-76-C-06-1830
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Steam containing hydrogen sulfide is purified and sulfur recovered by passing the steam through a reactor packed with activated carbon in the presence of a stoichiometric amount of oxygen which oxidizes the hydrogen sulfide to elemental sulfur which is adsorbed on the bed. The carbon can be recycled after the sulfur has been recovered by vacuum distillation, inert gas entrainment or solvent extraction. The process is suitable for the purification of steam from geothermal sources which may also contain other noncondensable gases. (ERA citation 05:023992)

PAT-APPL-6-030 974 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Decomposition of Silane on Tungsten or Other Materials.
Patent Application,
H. J. Wiesmann. Filed 18 Apr 79, 20p
Contract EY-76-C-02-0016
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention relates to hydrogenated amorphous silicon produced by thermally decomposing silane (SiH sub 4) or other gases comprising H and Si, from a W or foil heated to a temperature of about 1400 to 1600 exp 0 C, in a vacuum of about 10- exp 6 to 10- exp 4 torr. A gaseous mixture is formed of atomic hydrogen and atomic silicon. The gaseous mixture is deposited onto a substrate independent of and outside the source of thermal decomposition. Hydrogenated amorphous silicon is formed. The presence of an ammonia atmosphere in the vacuum chamber enhances the photoconductivity of the hydrogenated amorphous silicon film. (ERA citation 05:024364)

PAT-APPL-6-047 445 PC **A03**/MF **A01**
Department of Energy, Washington, DC.
Coated Woven Materials and Method of Preparation.
Patent Application,
W. J. McCreary, and D. W. Carroll. Filed 11 Jun 79, 31p
Contract W-7405-ENG-36
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Coating of woven materials so that not only the outer surfaces are coated has been a problem. Now, a solution to that problem is by coating with materials, with metals or with pyrolytic carbon. Materials are deposited in Chemical Vapor Deposition (CND) reactions using a fluidized bed so that the porosity of the woven materials is retained and the

tiny filaments which make up the strands which are woven (including inner as well as outer filaments) are substantially uniformly coated. (ERA citation 05:024453)

PAT-APPL-6-052 278 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Thermal Decomposition of Silane to Form Hydrogenated Amorphous Si.
Patent Application,
M. Strongin, A. K. Ghosh, H. J. Wiesmann, E. B. Rock, and H. A. Lutz, III. Filed 26 Jun 79, 15p
Contract EY-76-C-02-0016
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Hydrogenated amorphous silicon is produced by thermally decomposing silane (SiH sub 4) or other gases comprising H and Si, at elevated temperatures of about 1700 to 2300 exp 0 C, in a vacuum of about 10 exp -8 to 10 exp -4 torr. A gaseous mixture is formed of atomic hydrogen and atomic silicon. The gaseous mixture is deposited onto a substrate to form hydrogenated amorphous silicon. (ERA citation 05:024367)

PATENT-4 186 608
Not available NTIS
Department of Agriculture, Washington, DC.
Method and Apparatus for Verifying Declared Contents of Certain Solids.
Patent,
David J. Stanonis, Walter D. King, and Emory E. Coll. Filed 17 Jul 78, patented 5 Feb 80, 7p
PB80-190424, PAT-APPL-925 136
Supersedes PB-289 035.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An apparatus and method are provided for verification of declared contents in mixed solids, blended textiles, certain pure solids, and other solid substances. The apparatus is assembled from laboratory items and uses liquids and instruments. The method requires the measurement of changes in chain length in a chain suspended from the bottom of a float, and appliable values substituted in an equation which uses densimetric principles to achieve a comparative presentation of values for verification.

PATENT-4 192 819
Not available NTIS
Department of the Navy Washington DC
Method for Producing Hydrazines by Reacting Chloramine with Ammonia or Amines.
Patent,
Robert E. Farncomb, Kurt F. Mueller, and Kerry L. Wagaman. Filed 18 Aug 78, patented 11 Mar 80, 5p AD-D007 271/0, PAT-APPL-934 782
Supersedes PAT-APPL-934 782-78.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

Monomethylhydrazine and dimethylhydrazine are prepared in a multi-step process which comprises the steps of reacting chlorine and ammonia to form gaseous chloramine, introducing the chloramine into the lower reaction layer of a liquid two-phase caustic-amine or caustic/ammonia system, reacting the chloramine with the available ammonia or the available amine, and then transferring the forming hydrazine from the lower reaction layer to the upper storage layer of the two-phase system. (Author)

PATENT-4 199 650
Not available NTIS
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Modification of the Electrical and Optical Properties of Polymers.
Patent,
M. J. Mirtich, and J. S. Sovey. Filed 7 Nov 78, patented 22 Apr 80, 4p N80-24437/9, PAT-APPL-958 575
Supersedes PAT-APPL-958 575-78, N70-11216 (17 - 02, p 0164).
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

An electron bombardment argon ion source is used to form textured surfaces on polymide and fluorinated ethylene propylene polymers. This treatment improves the optical and electrical properties so that these polymers may be used in industrial and space applications.

PATENT-4 204 859
Not available NTIS
Department of Agriculture, Washington, DC.
Method of Increasing the Yield of Hydrocarbons from Plants.
Patent,
Henry Yokoyama, Ernest P. Hayman, Wan-Jean Hsu, and Stephen M. Poling. Filed 31 Mar 78, patented 27 May 80, 5p PB80-192297, PAT-APPL-891 955
Supersedes PB-283 628.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

Many plants produce hydrocarbons that can be employed as fuels; rubber, etc. One problem is that such plants do not produce a sufficient quantity of hydrocarbons to make their extraction both economical and feasible. Generally, the hydrocarbons are found throughout the plant tissue, i.e., in the stem, leaves, roots, etc. This invention relates to and has among its objects the provision of novel processes for increasing the accumulation of hydrocarbons in plants which produce the same. It is a particular object of the invention to increase the amount of rubber in rubber-producing plants.

PATENT-4 206 221
Not available NTIS
Department of Agriculture, Washington, DC.
Cephalomannine and Its Use in Treating Leukemic Tumors.
Patent,
Roger W. Miller, Richard G. Powell, and Cecil R. Smith, Jr. Filed 3 Jan 79, patented 3 Jun 80, 5p
PB80-195209, PAT-APPL-6-000 739
Supersedes PB-294 775.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A novel alkaloid named 'cephalomannine' has been produced from the tissue of plants belonging to the group commonly known as taxads and has proven to be effective in causing the remission of leukemic tumors in mice treated therewith.

PB80-191398 Not available NTIS
National Bureau of Standards, Washington DC.
On Some Approximations in Applications of X-alpha Theory.
Final rept.,
B. I. Dunlap, J. W. D. Connolly, and J. R. Sabin.
15 Oct 79, 7p
Pub. in J. Chem. Phys. 71, n8 p3396-3402, 15 Oct 79.

An approximate X alpha functional is proposed from which the charge density fitting equations follow variationally. LCAO X alpha calculations on atomic nickel and diatomic hydrogen show the method independent of the fitting (auxiliary) bases to within 0.02 eV. Variational properties associated with both orbital and auxiliary basis set incompleteness are used to approach within 0.2 eV the X alpha total energy limit for the nitrogen molecule.

PB80-191414 Not available NTIS
National Bureau of Standards, Washington, DC.
Absorbed Dose Distributions in Small Copper Wire Insulation Due to Multiple-Sided Irradiations by 0.4 MeV Electrons.
Final rept.,
A. Miller, W. L. McLaughlin, W. B. Pedersen, and K. Pejtersen. 1979, 6p
Pub. in Radiat. Phys. Chem. 13, p181-186 1979.

When scanned electron beams are used to crosslink polymeric insulation of wire and cable, an important goal is to achieve optimum uniformity of absorbed dose distributions. Accurate measurements of dose distributions in a plastic dosimeter simulating a typical insulating material (polyethylene) surrounding a copper wire core show that equal irradiations from as few as four sides give approximately isotropy and satisfactorily uniform energy depositions around the wire circumference. Electron beams of 0.4 MeV maximum energy were used to irradiate wires having a copper core of 1.0 mm dia. and insulation thicknesses between 0.4 and 0.8 mm. The plastic dosimeter simulating polyethylene insulations was a thin radiochromic polyvinyl butyral film wrapped several times around the copper wire, such that when unwrapped and analyzed optically on a scanning microspectrophotometer, high-resolution radial and depth-dose profiles could be determined.

PB80-192487 PC **A03**/MF **A01**
North Carolina State Univ. at Raleigh. Center for Engineering Applications of Radioisotopes.
Mathematical Techniques for X-Ray Analyzers.
Final rept. May 74-May 79,
Robin P. Gardner, and Kuruvilla Verghese. Apr 80, 42p EPA-600/2-80-070
Grant EPA-R-802759

Mathematical techniques and subsequent computer software were developed to process energy-dispersive x-ray fluorescence spectra for elemental analysis of airborne particulate matter collected on filters. The research concerned two areas: (1) determination of characteristic x-ray intensities and (2) determination of elemental amounts from the known characteristic x-ray intensities. In the first area, efforts primarily concentrated on developing and implementating of the library, linear least-squares method and included the two common non-linear aspects of XRF pulse-height spectra: excitation source background and pulse pile up. A detector response function model was also developed for si(Li) detectors to alleviate the necessity for obtaining and storing extensive complete library spectra for every element of interest. This approach gives improved accuracy, greatly reduces the experimental effort required, and is capable of accounting for variations in detector calibration and resolution without requiring extensive additional experimental effort. In the second research area the fundamental parameters method was developed by Monte Carlo simulation. Data were collected for several shapes of particles deposited on filters. Empirical correction factors for various practical cases of interest based on these simulations are reported.

PB80-193279 PC **A05**/MF **A01**
Southern Research Inst., Birmingham, AL.
Development of Air Sampling and Analytical Methods for Toxic Chlorinated Organic Compounds. Research Report for Hexachlorocyclopentadiene,
H. Kenneth Dillon. Feb 80, 84p SORI-EAS-80-057
Contract PHS-NIOSH-210-78-0012

This report describes the development of a sampling and analytical method for the determination of hexachlorocyclopentadiene in air. The developed method is based on the collection of the compound from air with a solid sorbent, Porapak T; desorption of the compound with hexane; and the analysis of the extract by gas chromatography with electron capture detection. The overall method was evaluated in the concentration range of about 13 to 865 microgram/cu m in 3-L air samples. The average bias from an independent analytical method was +1%; the pooled relative standard deviation was 8%.

PB80-194210 PC **A02**/MF **A01**
Municipal Environmental Research Lab., Cincinnati, OH.
Laboratory Technique for Measurement of pH for Corrosion Control and Water Not in Equilibrium with the Atmosphere.
Journal article,
Michael R. Schock, William Mueller, and Ralph W. Buelow. May 80, 6p EPA-600/J-80-015
Pub. in Jnl. of JAWWA 72, p304-306 May 80.

Factors governing pH changes that samples taken from systems closed to the atmosphere (pipe corrosion loops, distribution mains, household plumbing, ground and hypolimnotic waters) may undergo before and during conventional pH measurement is briefly discussed. Noticeable pH changes attrib-

utable to sample measurement while open to a different carbon dioxide partial pressure than in the source location were observed. A procedure and apparatus is outlined to minimize sample contact with the atmosphere during pH measurement, resulting in greater accuracy and reproducibility. Several other procedures to improve pH accuracy relating to electrode calibration and buffer solution storage are discussed.

PB80-194582 PC **A02**/MF **A01**
Environmental Research Lab., Athens, GA.
Photoreactivity of Selected Aromatic Hydrocarbons in Water.
Journal article,
Richard G. Zepp, and Patricia F. Schlotzhauer.
1979, 20p EPA-600/J-79-063
Pub. in Polynuclear Aromatic Hydrocarbons, International Symp. on Chemistry and Biology-Carcinogenesis and Mutagenesis (3rd), p141-158 1979.

Quantitative data concerning photoreactions of aromatic hydrocarbons were obtained in distilled water and several natural water samples. The reactions were studied at concentrations lower than the solubility limits of the aromatics, which in some cases were less than 1 microgram per liter. At these low concentrations, the photolyses were described by first-order rate equations, i.e., half-lives, were concentration-independent. Quantum yields and electronic absorption spectra were obtained for a series of naphthalenes, anthracenes, and polycyclic aromatics. These data were used in conjunction with simulated solar spectral irradiance and attenuation coefficients of water bodies to compute photolysis half-lives for the aromatic hydrocarbons in aquatic environments having varying depths and turbidities.

PB80-195332 PC **A02**/MF **A01**
National Inst. for Occupational Safety and Health, Cincinnati, OH. Div. of Physical Sciences and Engineering.
Development of a Quantitative Air Sampling and Analytical Method for Diethylcarbamoyl Chloride.
Research rept. 1978-79,
Robert A. Glaser. 1980, 23p

The air sampling and analytical method for diethylcarbamoyl chloride (DECC) involves collection of the analyte on Porapak P, a styrene-divinylbenzene porous polymer. The samples are desorbed with ethyl acetate and the resulting solution is analyzed by gas chromatography using a flame ionization detector. The method has been validated over the range of 40 - 1250 microgram/sample.

PB80-195993 PC **A02**/MF **A01**
Environmental Sciences Research Lab., Research Triangle Park, NC.
Composition of Size-Fractionated Aerosol in Charleston, West Virginia.
Journal article.
Charles W. Lewis, and Edward S. Macias. 22 Jan 79, 12p EPA-600/J-80-003
Pub. in Atmospheric Environment, v14 p185-194 1980. Prepared in cooperation with Washington Univ., St. Louis, MO. Dept. of Chemistry.

Atmospheric aerosols were collected during a 21 day period in late summer of 1976 in Charleston, West Virginia, using five dichotomous virtual impactor samplers simultaneously. The resulting coarse and fine aerosol were analyzed with a variety of physical and chemical methods: gravimetrically for total mass; by XRF for elements heavier than Mg; by proton induced gamma-ray emission for C, N and S; by ion chromatography for sulfate, nitrate and Na; and by ion selective electrode for ammonia. It was inferred that sulfur and nitrogen in the fine fraction were almost entirely in the form of ammonium sulfate, accounting for 41% of the total fine particle mass. Carbon was a large component of both fine and coarse particle mass, constituting 16% and 12%, respectively. Factor analysis of the data indicated that four factors were sufficient to satisfactorily represent the variance of 26 measured parameters. The factors are characteristic of crustal material, ammonium sulfate, automotive emissions, and an unidentified anthropogenic source or set of sources.

PB80-196009 PC **A02**/MF **A01**
Industrial Environmental Research Lab.-Cincinnati, Edison, NJ. Oil and Hazardous Materials Spills Branch.
Occurrence of Extractable Hydrocarbons in Sediments from Raritan Bay, New Jersey.
Journal article,
Dennis Stainken. 3 Jul 78, 8p EPA-600/J-79-091
Pub. in Bulletin of the New Jersey Academy of Science, v24 n1 p6-11 1979.

Sediments from 22 sites in the Raritan Bay-Lower New York Bay complex showed that extractable hydrocarbons and percent volatiles increased as the silt-clay content of the sediment increased. The hydrocarbons appeared to be concentrated in the deeper center of Raritan Bay and the Raritan Bay muds, heading down the Bay towards Sandy Hook. Extractable hydrocarbons ranged from 2.2-1098.2 micrograms/g of dry sediment and the percent of volatiles ranged from 0.85-11.39. A peak within the n-C23 range and a large 'unresolved complex mixture' were characteristic of gas chromatograms. Mixed isomers of benz-pyrene and benz-anthracence and unidentified 1-6 ring polynuclear aromatic hydrocarbons were present.

PB80-196306 PC **A02**/MF **A01**
Environmental Monitoring and Support Lab., Research Triangle Park, NC. Analytical Chemistry Branch.
Neutron Activation Analysis for Simultaneous Determination of Trace Elements in Ambient Air Collected on Glass-Fiber Filters.
Journal article,
J. P. F. Lambert, and F. W. Wilshire. 7 Feb 79, 7p EPA-600/J-79-092
Pub. in Analytical Chemistry, v51(9) p1346-1350 Aug 79.

Arsenic with 25 other elements are simultaneously determined in ambient air samples collected on glass-fiber filter composites at 250 United States sites. The instrumental neutron activation analysis (NAA) technique combined with the power of a dedicated mini-computer resulted in a routine analysis of the collected filter composites. The computer output defined ambient air levels for each element in units of nanograms per cubic meter. Values for the range determined, the mean, and coefficients of variation for split and control samples are reviewed for each of the elements involved in this multielement scan. Thirteen of the 26 elements are detected in concentrations above the discrimination limits in over 20% of the samples analyzed.

PB80-806793 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Chemiluminescence. 1977-April, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for 1977-Apr 80,
C. Gilbert Young. May 80, 106p
Sponsored in part by National Technical Information Service, Springfield, VA.

Cited works describe the use of chemiluminescence for aurora and upper-atmosphere analyses, evaluation of chemical laser candidates, studies of jet and combustor dynamics, smog analysis and other work. Sources and forms of chemiluminescence and measurement techniques are described. (Contains 92 citations)

SAND-79-0645 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Metal Tritides Helium Emission.
L. C. Beavis. Feb 80, 35p
Contract EY-76-C-04-0789

Over the past several years, we have been measuring the release of helium from metal tritides (primarily erbium tritide). We find that qualitatively all tritides of interest to us behave the same. When they are first formed, the helium is released at a low rate that appears to be related to the amount of surface area which has access to the outside of the material (either film or bulk). For example, erbium tritide films initially release about 0.3% of the helium generated. Most tritide films emit helium at about this rate initially. At some later time, which depends upon the amount of helium generated, the parent occluding element and the degree of tritium saturation of the dihydride phase the helium emission changes to a new mode in which it is released at approximately the rate at which it is generated (for example, we measure this value to be approx. = .31 He/Er for ErT sub 1 . sub 9 films). If erbium dititide is saturated beyond 1.9 T/Er, the critical helium/metal ratio decreases. For example, in bulk powders ErT sub 2 . sub 15 reaches critical release concentration at approx. = 0.03. Moderate elevation of temperature above room temperature has little impact on the helium release rate. It appears that the process may have approx. = 2 kcal/mol activation energy. The first helium formed is well bound. As the tritide ages, the helium is found in higher energy sites. Similar but less extensive measurements on scandium, titanium, and zirconium tritides are also described. Finally, the thermal desorption of erbium tritides of various ages from 50 days to 3154 days is discussed. Significant helium is desorbed along with the tritium in all but the youngest samples during thermodesorption. (ERA citation 05:020895)

SAND-79-2385C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Sputter Yield Determination for Binary Alloys.
G. C. Nelson. 1980, 14p CONF-800442-1
Contract EY-76-C-04-0789
Symposium on sputtering, Vienna, Austria, 28 Apr 1980.

Desorption cross sections and sputter yields for a 10 at% Pt to 90 at% Rh alloy have been measured for He exp 3 and Ne exp 20 ions in the energy range of 500 eV to 5000 eV. The energy dependence and magnitude of the sputter yields are consistent with what is predicted for the bulk material. (ERA citation 05:021390)

SAND-79-2392C PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Low Energy Ion Beam Systems for Surface Analytical and Structural Studies.
G. C. Nelson. 1980, 30p CONF-800466-2
Contract EY-76-C-04-0789
International conference on low energy ion beams 2, Bath, UK, 14 Apr 1980.

This paper reviews the use of low energy ion beam systems for surface analytical and structural studies. Areas where analytical methods which utilize ion beams can provide a unique insight into materials problems are discussed. The design criteria of ion beam systems for performing materials studies are described and the systems now being used by a number of laboratories are reviewed. Finally, several specific problems are described where the solution was provided at least in part by information provided by low energy ion analysis techniques. (ERA citation 05:023176)

SERI/TP-334-571 PC **A03**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Reactions at the Silver/Polymer Interface: A Review.
P. Schissel, and A. W. Czanderna. Feb 80, 50p CONF-800220-3
Contract EG-77-C-01-4042
Solar reflective materials workshop, San Francisco, CA, USA, 12 Feb 1980.

One of the possible solutions for improving mirrors for long-life, inexpensive solar concentrators is to coat the reactive mirror material with a polymer. Polymer-coated reflectors may improve optical efficiency and reduce the cost of solar mirrors. Because the mirror/polymer interface may have long-term instabilities in a solar-stressed environment, it is necessary to isolate the effects attributable to the bulk materials from those of the interface. Actual failure mechanisms are unknown but we present several possible explanations for failure of the polymer/mirror interface. The purpose of the paper is to review the literature on one of the systems of great current interest, the silver/polymer interface. First, the components of this interface are considered separately. Studies of reactions of environmental gases with silver are summarized. Then, several candidate fluoropolymers and polymethylmethacrylate are considered independently of the metal. The thermal, photo, and oxidative degradation reactions are briefly outlined. Finally, the limited data actually obtained on the silver/polymer interface are summarized. Results obtained on the silver/Teflon-FEP interface are

emphasized because its use for thermal control panels in the space program resulted in extensive study. 117 references. (ERA citation 05:022234)

UCRL-52925 PC **A07/MF A01**
California Univ., Livermore. Lawrence Livermore Lab.
Theory of Atomic Motion in Resonant Radiation.
R. J. Cook. Mar 80, 138p
Contract W-7405-ENG-48
Thesis.

Atomic motion in resonant and near resonant electromagnetic radiation is investigated theoretically. The exposition begins with a study of atomic motion in a resonant standing light wave, with a view toward isotope separation by selective photodeflection, and proceeds to the investigation of more general problems of atomic motion in resonant radiation. The body of the work consists of six chapters, each of which was prepared as a manuscript for publication in the open literature. (ERA citation 05:021381)

7E. Radio and Radiation Chemistry

AD-A085 378/8 PC **A02/MF A01**
University of Southern California Los Angeles Dept of Chemistry
Photooxidation of 1,1,1-Trimethyl-2,2,2-Triphenyldisilane by Dimethyl Sulfoxide.
Robert E. Swaim, and William P. Weber. 24 Jan 79, 6p AFOSR-TR-80-0366
Grant AFOSR-77-3123
Pub. in Jnl. of the American Chemical Society, v101 p5703-5706 1979.

No abstract available.

COO-4685-2 PC **A02/MF A01**
Wayne State Univ., Detroit, MI.
Photochemical Activation and Reactivity of Polynuclear Transition Metal Complex Molecules. Progress Report, June 1979-May 31, 1980.
J. F. Endicott, and R. L. Lintvedt. Feb 80, 8p
Contract ER-78-S-02-4685

During this contract year several new ligands and binuclear metal complexes have been prepared including many that can be expected to exhibit long-lived excited states. The metal ions represented are Cu(II), Ni(II), Co(II), Mn(II), Cr(III), Ti(IV), V(IV), U(VI), and Pd(II). In addition, many mononuclear complexes that are precursors in the formation of heterobinuclear complexes were prepared. These include complexes of Cu(II), Ni(II), Pd(II), and Ru(II). Many of these compounds will be used in photochemical and electron transfer studies. Polarographic, cyclic voltammetric and coulometric studies have been carried out on a number of binuclear Cu(II) triketonates and their Schiff-base derivatives. Most of these compounds undergo reversible or quasi-reversible two electron transfer reactions which makes them potetially useful electron transfer reagents. Much of the electrochemical data can be rationalized by the formation of dimers which are new electroactive species. The importance of such species in multi-electron transfer processes is being investigated. (ERA citation 05:020990)

8. EARTH SCIENCES AND OCEANOGRAPHY

8A. Biological Oceanography

PB80-192834 PC **A05/MF A01**
National Coastal Ecosystems Team, Slidell, LA.
Observations of Marine Birds and Mammals in the Northern Chesapeake Bight.
Technical rept. 1971-1977,
Richard A. Rowlett. Feb 80, 100p FWS/OBS-80/04

Sightings of 56 species of marine birds and 11 species of marine mammals recorded from 1971 to 1977 are summarized to show species composition and spatial and temporal distribution over the Continental Shelf in the northern Chesapeake Bight. Distributional abundance of seabirds is indicated relative to sounding contours and to the average distance from shore. Cetaceans and pelagic birds are most abundant between the 30- and 40-fathom contour and along the edge of the Continental Shelf, especially Baltimore Canyon. Gulls of the genus Larus composed 71.8% of the offshore avifauna from November through March. Wilson's storm petrel accounted for 66.6% of all seabirds counted from May through September. Distribution of tropical and subtropical seabirds and cetaceans corresponds to the presence of warm slope water and Gulf Stream eddies.

PB80-193220 PC **A02/MF A01**
Johns Hopkins Univ., Baltimore, MD. Chesapeake Bay Inst.
Status of Commercially Important Bivalves Near the Proposed Church Creek Power Plant Site.
Special rept.,
D. Scott Becker, and Leslie S. Kaufman. Sep 79, 22p CBI/SR-75, REF-79-6

This report is an assessment of the status of commercially important bivalve molluscs near the proposed Church Creek Power Plant intake/discharge site. Data on the soft-shell clam (Mya arenaria) and the oyster (Crassostrea virginica) were obtained from surveys using a commercial clam dredge, a diver-operated suction sampler, visual reconnaissance, and records. Young soft-shell clams were virtually absent, and other infaunal bivalves were present at relatively low abundance. The maximum density of marketable soft-shell clams was 16 bushels per acre, too low for commercial exploitation. Adult soft-shell clams were apparently less abundant in deeper water. This reduces the likelihood that commercial densities of soft-shell clams or oysters will occur naturally at this location in the future.

PB80-193238 PC **A02/MF A01**
Johns Hopkins Univ., Baltimore, MD. Chesapeake Bay Inst.
A Bathymetric Survey of the Proposed Church Creek Power Plant Site.
Special rept.,
D. S. Becker, J. A. Conte, and L. S. Kaufman. Jun 79, 14p CBI/SR-73, REF-79-4

This report presents the results of a bathymetric survey carried out off Taylors Island, Maryland in the vicinity of the proposed Church Creek Power Plant Site. Depth contours (corrected for tidal height) at intervals of 2 feet are presented for depths between 6 and 40 feet. The original data are available on magnetic tape if better resolution is desired.

PB80-194228 PC **A03/MF A01**
Guam Univ., Agana. Water Resources Research Center.
Nitrogen Uptake by Tropical Freshwater Macrophytes.
Stephen G. Nelson, Barry D. Smith, and Bruce R. Best. Feb 80, 31p TR-10, W80-05539, OWRT-A-014-GUAM(1)
Contract DI-14-34-0001-9012
Also pub. as Guam Univ., Agana. Marine Lab. Technical rept. no. 56.

The kinetics of nitrogen uptake were examined for three species of aquatic macrophytes which are common on Guam. Nitrate-nitrogen and ammonium-nitrogen uptake by Pistia stratiotes were monitored in response to a wide range of substrate concentrations. First order kinetics of nitrate-nitrogen uptake were examined for Pistia stratiotes, Hydrilla verticillata and Microspora sp. Uptake rates were higher after twenty-four hours of exposure to the nitrate source than immediately after exposure. The rate of uptake of nitrate-nitrogen by P. stratiotes was greater in the light than in the dark. Nitrate uptake followed a pattern which could be described by the Michaelis-Menton expression. Rates of ammonium-nitrogen uptake were similar in the dark and in the light. Ammonium-nitrogen uptake response to substrate concentration appeared to be linear.

PB80-197171 PC **A07/MF A01**
New York Sea Grant Inst., Albany.
Marine and Aquatic Field Trip Guide to New York State,
Robert Jaeger. 1980, 145p NYSG-RE-80-15, NOAA-80060206

The Marine and Aquatic Field Trip Guide to New York State incorporates marine and aquatic education into existing elementary, intermediate, and secondary curricula. It is a guide written by educators throughout the state who have found a particular field site suitable to their needs. With each trip the author-educator attempts to extend the classroom, to broaden the scope and impact of the lesson, and to develop an awareness of the environment that only 'being there' can establish. The sites are listed by county, starting from Montauk Pt. and moving upstate.

PB80-197650 PC **A04/MF A01**
Rosenstiel School of Marine and Atmospheric Science, Miami, FL. Div. of Biology and Living Resources.
Abundance of the Bottlenose Dolphin, 'Tursiops truncatus', on the West Coast of Florida.
Final rept.,
Daniel K. Odell, and John E. Reynolds, III. Jul 80, 56p MMC-75/16
Contract MM5AC026

Aerial surveys were conducted to assess the distribution and estimate the density of bottlenose dolphins (Tursiops truncatus) along the Gulf coast of Florida. Nine flights totalling 168 air-hours and covering 15,000 linear km were made between June 1975 and May 1976. Twenty-one stranded cetaceans, including the genera Tursiops, Kogia, Mesoplodon, Feresa and Globicephala were salvaged.

PB80-197718 PC **A03/MF A01**
National Marine Fisheries Service, Seattle, WA.
Guide to Some Trawl-Caught Marine Fishes from Maine to Cape Hatteras, North Carolina,
Donald D. Flescher. Mar 80, 44p NOAA-TR-NMFS-CIRC-431, NOAA-80051305

Fishes covered are those regularly caught during trawling operations. Similar shaped fishes are grouped together. On each page the written keys are connected by lines to the fish illustrations; consequently, technical terms in the keys are illustrated as they are used. Notes on the size and range of each fish are included.

PB80-198104 PC **A02**
Gulf Coast Research Lab., Ocean Springs, MS.
Crustacean Health Research at the Gulf Coast Research Laboratory,
Robin M. Overstreet. May 80, 17p NOAA-80051503
Pub. in Proceedings of the Biennial Crustacean Health Workshop (2nd), held at Texas A and M Univ., College Station, Texas, July 1979.

A brief summary is presented of the research of the Gulf Coast Research Laboratory. The research encompasses the various aspects of the health of the blue crab, penaeid shrimp, and other crustaceans. Disease causing organisms are identified.

PB80-198880 PC **A07/MF A01**
Alaska Dept. of Fish and Game, Juneau.
Alaska Tanner Crab ('Chionoecetes bairdi') Investigations.
Completion rept. 1 Jul 76-30 Jun 79,
William Donaldson. Mar 80, 132p NOAA-80050801

From the study on growth, growth rate, age at size, and size at sexual maturity for male and female Tanner crab, Chionoecetes bairdi, in the Northern Gulf of Alaska, were estimated. The estimates are based upon observed growth from crabs held in ocean pens and from modal groups evident in size frequency distributions. Studies on permanent tag development showed that dorsal tagging caused 30% mortality, posterior 10%, while all suture (Pereipod) tagged crabs survived when tagged with the FD-68B tag. In a study of migration, 1412 tagged crab were recovered between 1973 and 1978 with accurate recovery information.

8C. Dynamic Oceanography

AD-A085 304/4 PC **A04/MF A01**
Woods Hole Oceanographic Institution MA
Measurement of Ocean Surface Currents Using a Ship Towed Log.
Technical rept.,

David S. Bitterman, Jr. May 80, 73p Rept no. WHOI-80-20
Contract N00014-79-C-0071

A ship towed log for use on ships-of-opportunity to measure ocean surface currents was built and tested over the past two years. The technique used is one of the oldest known to navigators. The ship's dead reckoned position is calculated from the speed and heading as measured by the towed log. This is then compared to the ship's true position as obtained from a reference navigation system (Loran, satellites, etc.) and the difference is attributed to the currents encountered by the ship. The system was used on six sea cruises and was successfully towed over 11,000 miles. While it is not capable of making high precision current measurements as would be obtained from moored current meters, it can distinguish features on the order of 20 to 30 cm/sec. over a large horizontal scale in the upper ocean. (Author)

AD-A085 381/2 MF **A01**
Naval Oceanographic Office NSTL Station MS
Surface Currents, Northwest Central South Pacific Ocean.
Nov 77, 27p Rept no. NOO-SP-1403-SP-2
Availability: Microfiche copies only.

This atlas, and the series of which it is a part, is computer generated and automatically plotted. It makes available to the user the most recent surface current data collected and will be updated whenever sufficient amounts of data are added to the data file. This and the other atlases are based on a vast quantity of data as compared to the previous manually-compiled editions printed in the mid-thirties. The surface current information is based mainly on ship drift, which is the difference between the dead reckoning position and the position determined by any type of navigational fix. This difference describes the direction and speed of the current. (Author)

AD-A085 439/8 MF **A01**
Naval Oceanographic Office NSTL Station MS
Surface Currents. East Central North Atlantic Ocean.
Final rept.
Apr 78, 25p Rept no. NOO-SP-1400-NA-7
Availability: Microfiche copies only.

This atlas, and the series of which it is a part, is computer generated and automatically plotted. It makes available to the user the most recent surface current data collected and will be updated whenever sufficient amounts of data are added to the data file. This and the other atlases are based on a vast quantity of data as compared to the previous manually-compiled editions printed in the mid-thirties.

AD-A085 440/6 MF **A01**
Naval Oceanographic Office NSTL Station MS
Surface Currents. Southeast North Pacific Ocean Including the West Coast of Central America.
Final rept.
Aug 77, 50p Rept no. NOO-SP-1402-NP-13
Availability: Microfiche copies only.

For abstract see AD-A085 439.

AD-A085 441/4 MF **A01**
Naval Oceanographic Office NSTL Station MS
Surface Currents. Greenland Sea Including Denmark Strait.
Final rept.
Jan 78, 25p Rept no. NOO-SP-1400-NA-1
Availability: Microfiche copies only.

For abstract see AD-A085 539.

AD-A085 442/2 MF **A01**
Naval Oceanographic Office NSTL Station MS
Surface Currents. Northwest South Pacific Ocean Including the Coral and Solomon Seas.
Final rept.
Oct 77, 25p Rept no. NOO-SP-1403-SP-1
Availability: Microfiche copies only.

For abstract see AD-A085 439.

AD-A085 443/0 MF **A01**
Naval Oceanographic Office NSTL Station MS
Surface Currents. Northeast Central South Pacific Ocean.
Final rept.
Nov 77, 26p Rept no. NOO-SP-1403-SP-3
Availability: Microfiche copies only.

For abstract see AD-A085 439.

AD-A085 444/8 MF **A01**
Naval Oceanographic Office NSTL Station MS
Surface Currents. West Central Indian Ocean Including Mozambique Channel.
Final rept.
Oct 77, 25p Rept no. NOO-SP-1404-IN-3
Availability: Microfiche copies only.

For abstract see AD-A085 439.

AD-A085 445/5 MF **A01**
Naval Oceanographic Office NSTL Station MS
Surface Currents. Norwegian and Barents Seas.
Final rept.
1980, 28p Rept no. NOO-SP-1400-NA-2
Availability: Microfiche copies only.

For abstract see AD-A085 439.

AD-A085 473/7 PC **A03**/MF **A01**
Naval Research Lab Washington DC
Observation by HF Radar of the Phillips Resonance Mechanism for Generation of Wind Waves.
Interim rept.,
D. B. Trizna, R. W. Bogle, J. C. Moore, and C. M. Howe. 14 Mar 80, 41p NRL-8386, AD-E000 426

Measurements are reported of directional ocean wave spectra made over 80 deg of viewing angle by an HF radar, operating in the surface wave mode in an area 22.5 km north of San Clemente Island, California. Ten azimuths from 280 to 360 deg true bearing were simultaneously measured for ten wave frequencies ranging from 0.14 Hz (75-m waves) to 0.35 Hz (13-m waves). A Waverider buoy was used to measure omnidirectional energy in the region, and first-order radar Bragg lines were used to determine the spreading of wave energy with angle. Data are presented in which a bimodal spectrum was present: an attenuated spectrum with wave components to 0.10 Hz from a storm at sea at 270 deg bearing; and a transient local wind spectrum, stronger in amplitude at the higher frequencies, with wave cutoff near 0.14 Hz, and running from 315 deg bearing. Just after the onset of local winds, the westerly spectrum fit a cosine squared spread at the lowest measured frequencies. With the development of local wind which blew at a 12 to 14 knot speed for a period of 12 h, the wave spectrum spread about the wind direction as cosine thirty-second at the lowest frequencies measured, 0.14 Hz, and cosine sixty-fourth at the highest frequencies measured, 0.35 Hz. For 0.28 Hz waves, the Phillips resonance mechanism for wave generation is proposed to explain the twin peaks in amplitude observed, equally spaced either side of the wind direction. These were dominant for the earliest measurement period, and still major contributions for later measurement periods.

DOE/EV/10216-1 PC **A02**/MF **A01**
Washington Univ., Seattle.
Bomb Radiocarbon Sections Along the Hawaii-Tahiti Shuttle Track. Annual Progress Report.
M. Stuiver. 27 Feb 80, 7p
Contract AT06-79EV10216

The objective of the research is to use the temporal and spatial distribution of the transient, bomb-produced exp 14 C in the equatorial Pacific Ocean to determine mixing rates in the upper 1000 m of the ocean. To accomplish this goal approximately 400 exp 14 C samples were collected during two legs of the NORPAX shuttle. There is extensive relative depletion in exp 14 C of the equatorial surface waters. This feature of the surface water exp 14 C distribution, coupled with the depth distribution of exp 14 C and the physical and chemical (nutrient) oceanographic data collected during the NORPAX program should allow us to estimate the rate of upwelling in the equatorial Pacific. (ERA citation 05:021205)

N80-26023/5 PC **A07**/MF **A01**
National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, VA.
Geos-3 Radar Altimeter Study for the South Atlantic Bight.
C. D. Leitao, N. Huang, C. L. Parsons, C. G. Parra, and J. D. Mcmill. May 80, 144p NASA-TM-73286
Contract DI-AA551-IA8-39

Three years of radar altimeter data from GEOS-3 for the South Atlantic Bight were processed. Mean monthly topographic maps were produced which estimate geostrophic flow in the region. Statistical distribution of the surface wind speed and significant wave height as a function of both space and time are presented.

PB80-193006 PC **A03**/MF **A01**
National Inst. of Oceanography, Panaji (India).
Ocean Science Research: Proceedings of the Indo-U.S. Workshop on Oceanography, Held at National Institute of Oceanography, Goa (India) on November 13-17, 1978.
17 Nov 78, 36p
Contract NSF-INT78-24030
Sponsored in part by Ocean Science and Technology Agency, New Delhi (India).

The Workshop address four major areas of oceanography: The interaction between the monsoon and ocean circulation and characteristics of the Indian Ocean; Factors influencing biological productivity of the Northern Indian Ocean; Sources, fluxes, and fates of materials entering the seas around India; Marine geoscientific studies of the Indian margins and plate tectonic phenomena.

PB80-196041 PC **A03**/MF **A01**
National Weather Service, Salt Lake City, UT. Western Region.
The SWAB (Spectral Wave And Bar) Program,
Morris S. Webb, Jr. Mar 80, 36p NOAA-NWS-WRCP-9, NOAA-80051302

The SWAB (Spectral Wave and Bar) program allows the wave forecast technique developed by the School of Oceanography at Oregon State University to be used in AFOS. The program is essentially a revised and condensed version of a Fortran IV program. Variables describing the history of one, two, or three fetches are used by SWAB to produce a forecast out to 48 hours of significant wave height and period at a given point. This forecast, along with data from the National Ocean Survey's Tidal Current Tables, is used to predict bar conditions at a time of maximum ebb current at several locales. The wave forecast method of Pierson, Neumann, and James is the basis for SWAB.

PB80-196967 PC **A04**/MF **A01**
State Univ. of New York at Stony Brook. Marine Sciences Research Center.
A Suggestion for Anticipating Alterations in Wave Action on Shores Consequent Upon Changes in Water Depths in Harbors and Coastal Waters.
Special rept.,
Blair Kinsman, J. R. Schubel, George E. Carroll, and Mary Glackin-Sundell. Jul 79, 72p SR-27, REF-79-10, NOAA-80060205
Errata sheet inserted.

Until the advent of the high-speed computer the ability to trace wave rays has been of little practical value to those who must make decisions about coastal protection and the issuance of dredging permits. Today, wave ray tracing is a practical tool. The existing bathymetry of a region can be stored in the memory of a computer and rays for the characteristic systems of waves which exist offshore rapidly traced in to their points of impact. It offers a relatively simple way to determine the effect of any proposed dredging on the distribution of wave energy along the coastline before any dredging is done.

PB80-812878 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Ocean Wave Sensing. 1964-June, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Jun 80,
Audrey S. Hundemann. Jul 80, 271p
Supersedes NTIS/PS-79/0663 and NTIS/PS-78/0560.

Abstracts pertaining to methods and equipment for measuring ocean waves and sea surface rough-

ness are presented. Remote sensing of ocean waves, height indicators, wave spectrum measurement, the use of radar, wave direction detection, and a few abstracts dealing with general studies are included. (This updated bibliography contains 263 citations, 11 of which are new entries to the previous edition.)

8G. Geology and Mineralogy

GJBX-19(80) MF **A01**
Bendix Field Engineering Corp., Grand Junction, CO.
Summary Geologic Report on the Spor Mountain Drilling Project in Juab County, Utah.
B. C. Morrison. Jan 80, 213p
Contract EY-76-C-13-1664
Microfiche copies only.

The NURE report of 1976 shows 5500 tons of probable and 162,000 tons of possible uranium resources in a projected widespread beryllium tuff in the project area. The goal of the the Spor Mountain drilling project was to obtain subsurface geologic data related to the tuff which would make possible a more accurate estimate of the uranium resources. In the immediate area of the drilling project, Paleozoic rocks are overlain by three groups of Tertiary volcanic rocks. The Paleozoic rocks of Spor Mountain represent an upthrown fault block in reference to the volcanic rock-filled structural basin underlying the Thomas Range to the east. Altered tuffaceous rocks at Spor Mountain are the hosts for deposits of beryllium, fluorite, and uranium minerals. The topaz-bearing rhyolite is the capping rock. BFEC geologists have concluded that nearly all the tuff units of the Thomas Range-Spor Mountain area, including the beryllium tuff, have an ash-flow origin. There were 21 rotary and 9 core holes drilled for a total drill footage of 33,358 ft, representing 21,754 ft of rotary and 11,604 ft of core footage. Analyses run on selected samples included gamma-ray spectroscopy, spectrochemical (29 elements), and assays for seven elements (U sub 3 O sub 8 , Mn, V, Cs, Li, Be, and Se). Specific ion analysis was run for fluorine. Gamma-ray, self-potential, resistivity, and neutron activation surveys were run on 28 holes; gamma-ray, caliper, resistivity, and density surveys were run on 12 holes; KUT surveys were run on 12 holes. Beryllium tuff was found to be present in only 20 percent of the area inferred in the publication Preliminary Study of Favorability for Uranium Resources in Juab County, Utah (GJBX--23(78), February, 1978). Also, the uranium-favorable areas as outlined in the present study represent only 18 percent of that inferred in the above-mentioned publication. (ERA citation 05:021827)

METC/EGSP-105 PC **A03**/MF **A01**
New York State Museum, Albany. Science Service Div.
Isopach MAP of Black Shale in the Perrysburg FM. (and Equivalent Section) (From Well Sample Studies).
D. G. Kamakaris, and A. M. Van Tyne. 1980, 32p
Contract AS21-76MC05206

A map of western New York State and Lake Erie was prepared containing information on black shale deposits in the Perrysburg FM. (and equivalent section) from well sample studies. (ERA citation 05:021803)

METC/EGSP-106 PC **A03**/MF **A01**
New York State Museum, Albany. Science Service Div.
Isopach MAP of Black Shale in the Java Formation (From Well Sample Studies).
D. G. Kamakaris, and A. M. Van Tyne. 1980, 32p
Contract AS21-76MC05206

A map of western New York State and Lake Erie was prepared containing information on black shale deposits in the Java Formation from well sample studies. (ERA citation 05:021804)

METC/EGSP-107 PC **A03**/MF **A01**
New York State Museum, Albany. Science Service Div.
Isopach MAP of Black Shale in the West Falls Formation (From Well Sample Studies).
D. G. Kamakaris, and A. M. Van Tyne. 1980, 36p
Contract AS21-76MC05206

Maps of western New York State and Lake Erie were prepared containing information on black shale deposits in the West Falls Formation from well sample studies. (ERA citation 05:021805)

METC/EGSP-109 PC **A03**/MF **A01**
New York State Museum, Albany. Science Service Div.
Isopach MAP of Black Shale in the Genesee Group (From Well Sample Studies).
D. G. Kamakaris, and A. M. Van Tyne. 1980, 32p
Contract AS21-76MC05206

A map of western New York State was prepared containing information on black shale deposits in the Genesee Group from well samples. (ERA citation 05:021806)

METC/EGSP-110 PC **A03**/MF **A01**
New York State Museum, Albany. Science Service Div.
Isopach MAP of Black Shale in the Hamilton Group (From Well Sample Studies).
D. G. Kamakaris, and A. M. Van Tyne. 1980, 32p
Contract AS21-76MC05206

A map of western New York State and Lake Erie was prepared containing information on black shale deposits in the Hamilton Group from well sample studies. (ERA citation 05:021807)

METC/EGSP-1400 PC **A04**/MF **A01**
Geological Survey, Reston, VA.
Maps Showing Location of Stratigraphic Cross Sections and Cored Drill Holes Used in the Study of the Devonian Black Shales in the Appalachian Basin.
J. B. Roen, L. G. Wallace, R. C. Kepferle, P. E. Potter, and W. A. Pryor. 1980, 67p
Contract EX-76-A-01-2287

Maps were prepared showing the location of drill holes used in the stratigraphic study of black shale deposits in the Appalachian Basin. (ERA citation 05:021808)

N80-25966/6 PC **A04**/MF **A01**
National Aeronautics and Space Administration, Washington, DC.
Nasa Geodynamics Program.
Annual Report, 1979.
May 80, 65p NASA-TM-81978

The history and development of the geodynamics program are described, in addition to accomplishments and plans for the future years activities. Extramural grant titles are listed for general research, Lageos investigations, and Magsat investigations.

PATENT-4 196 619 Not available NTIS
National Aeronautics and Space Administration. Pasadena Office, CA.
Geological Assessment Probe.
Patent,
E. R. Collins. Filed 25 Sep 78, patented 8 Apr 80, 8p N80-24906/3, PAT-APPL-945 436
Supersedes PAT-APPL-945 436-78, N80-12642 (18 - 3, p 0365). Sponsored by NASA.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

A probe is described which can be installed in a side hole that extends from a bore hole in the Earth, to assess the permeability of the strata surrounding the borehole. The probe is elongated and has a plurality of seals spaced therealong and sealed to the walls of the side hole to form a plurality of chambers sealed from one another. A tracer fluid injector on the probe can inject a tracer fluid into one of the chambers, while a tracer fluid detector located in another chamber can detect the tracer fluid, to thereby sense the permeability of the strata surrounding the side hole. The probe can include a train of modules, with each module having an inflatable packer which is inflated by the difference between the borehole pressure and the strata pressure.

PB80-195985 PC **A03**/MF **A01**
Woods Hole Oceanographic Institution, MA.
Assessment of Seabed Seismic Systems.
Elizabeth T. Bunce. Apr 80, 28p WHOI-80-24
Prepared in cooperation with Sandia Labs., Livermore, CA.

This project was initiated to accomplish the necessary research and documentation of existing seismic techniques and systems for the study of sediments and sedimentary structures in the oceans.

8H. Hydrology and Limnology

AD-A085 392/9 PC **A02**/MF **A01**
Louisiana State Univ Baton Rouge Coastal Studies Inst
Positioning Accuracy for Estuarine and Inlet Dynamics,
William J. Wiseman, Jr., Stephen P. Murray, and John T. Wells. 1978, 8p Rept no. TR-300
Contract N00014-75-C-0192
Pub. in Proceedings of the American Congress on Surveying and Mapping, Symposium on Measurements, Mapping and Management in the Gulf Coastal Zone, p137-141 2-5 May 78.

No abstract available.

ANL-78-65(Pt.3) PC **A07**/MF **A01**
Argonne National Lab., IL.
Radiological and Environmental Research Division: Ecology. Annual Report, January-December 1978.
1978, 129p
Contract W-31-109-ENG-38

Ecological studies continue to focus on the determination of the effects of energy-related pollutants on planktonic species typical of the Great Lakes. Also included were experimental studies of the effects of enclosure size on the response of zooplankton to stress by cadmium. A new mobile field laboratory was constructed to support studies of the effects of water temperatures regimes on rates of accumulation by salmonid fishes of persistent organic contaminants such as PCB's. A significant new addition to the Great Lakes Research Program was marked by the arrival and formal acceptance of the new research vessel, the R/V Ekos. Descriptions of the Ekos and its research capabilities are included. A variety of studies of the behavior of transuranic elements conducted in environments as diverse as the Irish Sea, Great Slave Lake, the Great Miami River, and the Great Lakes, have focused on changes in the oxidation state of plutonium, and the effects these changes have on the behavior of this important element in the aquatic environment. Twenty-six sections of the report were abstracted and indexed individually for inclusion on ERA/EDB and those in scope for INIS. (ERA citation 05:021199)

PB80-193261 PC **A04**/MF **A01**
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
Spectral Growth and Nonlinear Characteristics of Wind Waves in Lake Ontario,
Paul Chi Liu. Nov 79, 63p NOAA-TR-ERL-408, GLERL-14, NOAA-80050701

Recent studies have shown that the growth processes of wind waves are primarily associated with the nonlinear energy flux due to wave-wave interactions. A detailed empirical examination of these interactions uses calculated unispectra, bispectra, and trispectra of continuously recorded wave data during three episodes of growing waves. While the unispectrum provides information on the energy content of the frequency components, the bispectrum and trispectrum generally provide information on the interactive relations between two- and three-frequency components respectively. These higher-order interactive relations can be considered characterization of nonlinear interactions. The results indicate that the peak-energy frequency transfers more energy to the lower frequency components than to the higher ones, which is confirmation that unispectral peaks shift progressively toward lower frequencies during wave growth.

PB80-193329 PC **A03**/MF **A01**
Great Lakes Basin Commission, Ann Arbor, MI.
U.S. Heavy Metal Loadings to the Great Lakes: Estimates of Point and Nonpoint Contributions.
Final rept.,

Thomas M. Heidtke, Douglas J. Scheflow, and William C. Sonzogni. Jan 80, 39p GLBC/GLEPS-12
Sponsored in part by Water Resources Council, Washington, DC.

Estimates of current and future loadings of copper, zinc, lead and cadmium to the Great Lakes from municipal wastewater effluents and land drainage in the U.S. were generated using information provided by individual water quality management (208) plans, as well as other recent studies of point and nonpoint source pollution within the basin. Projections indicate that by the year 1990 the U.S. municipal point source contribution will likely decrease by 20-30% from mid-1970 levels as a result of phosphorus control measures. In the absence of additional programs to control land drainage in the U.S., the annual lake input of these metals from rural runoff should exhibit a slight decrease (less than 5%) over the next 20 years, whereas loadings attributable to urban runoff should increase up to 20% over the same period.

PB80-193824 PC **A02**/MF **A01**
Guam Univ., Agana. Water Resources Research Center.
The GHURA-Dededo Deep Monitoring Well: Planning and Design.
Technical rept.,
Charles J. Huxel. May 80, 24p TR-15, W80-05540, OWRT-A-008-GUAM(1)
Contract DI-14-34-0001-8012

The final design of Guam's first deep monitoring well has evolved from an open borehole concept through a three-well system and finally to the present one-well system. The one-well system utilizes an inflatable packer assembly which will permit the accomplishment of several goals: (1) Observation and simultaneous recording of point-water heads at 2 different levels. (2) Collection of water samples from isolated aquifer intervals. (3) Definition of a depth-salinity curve for the water column in the monitoring well.

PB80-193857 PC **A03**/MF **A01**
Guam Univ., Agana. Water Resources Research Center.
A Review of Techniques for Studying Freshwater/Seawater Relationships in Coastal and Island Groundwater Flow Systems.
Technical rept.,
Dinshaw N. Contractor. May 80, 35p TR-11, W80-05538, OWRT-A-007-GUAM(1)
Contracts DI-14-34-0001-7024, DI-14-34-0001-9012

This report reviews and summarizes the analytic and numeric methods available for the study of saltwater intrusion into freshwater aquifers in coastal and island situations. The methods are divided into three categories. The first deals with closed-form analytic solutions of steady interface problems using the hodograph method. In these problems, the saltwater and freshwater are separated by an abrupt interface and the location of this interface is determined for simple aquifer geometries and boundary conditions. These solutions can also be used to test the accuracy of numerical techniques. The second category of methods deals with solutions using the Dupuit and Ghyben-Herzberg approximations.

PB80-193865 PC **A04**/MF **A01**
Connecticut Univ., Storrs.
Heavy Metal Distribution in Two Connecticut Wetlands: A Red Maple Swamp and a 'Sphagnum' Bog.
Master's thesis,
James A. Laundre. 1980, 65p W80-05514, OWRT-A-073-CONN(2)
Contract DI-14-31-0001-6007

The vertical distribution of Zn, Cu, Pb, Ni, Mn, K, Na, N, Fe, and Al was studied in a series of peat cores taken from two Connecticut wetlands: a mesotrophic red maple swamp and an oligotrophic Sphagnum bog. In addition, water table fluctuation, sulfide levels, and elemental input from leaf litter were measured and used in interpreting the distributional patterns of the elements. Within the two wetlands most elements accumulate to some extent in the peat above the water table. Cu, Ni, Mn, Fe, Na, and K enrichment does occur in border areas that are influenced by inflowing spring water.

PB80-193931 PC **A04**/MF **A01**
Texas Dept. of Water Resources, Austin.
Analytical Study of the Ogallala Aquifer in Gray County, Texas: Projections of Saturated Thickness, Volume of Water in Storage, Pumpage Rates, Pumping Lifts, and Well Yields,
Ann E. Bell, and Shelly Morrison. Jan 80, 69p TDWR/R-243
Color illustrations reproduced in black and white.

This is one of numerous planned county studies covering the declining ground-water resource of the Ogallala aquifer in the High Plains of Texas. The report contains maps, charts, and tabulations which reflect estimates of the volume of water in storage in the Ogallala aquifer in Gray County and the projected depletion of this water supply by decade periods through the year 2020.

PB80-194343 PC **A06**/MF **A01**
Missouri Univ.-Columbia. Dept. of Geology.
Gravity Geophysical Delineation of Buried Channel Aquifers in the Dissected Till Plains of Northern Missouri.
Master's thesis,
Morris David Hall. Dec 79, 105p W80-05463, OWRT-A-112-MO(2)
Contract DI-14-34-0001-9027

Several methods of gravity geophysics, in conjunction with drift thickness and bedrock topography maps, were used to map the location of buried river valleys in northwestern Missouri. Drift thickness varies from zero to over 100 meters within the selected study area. The buried valleys are often filled with thick sequences of glacial-fluvial deposits which can serve as important aquifers. Over 900 gravimeter readings established a grid network over the study area. Two methods were used to calculate the regional Bouguer free-air anomaly. Gravity profiles were run normal to several suspected buried valleys. The gravity residual profiles showed a strong correlation to bedrock topography, where known, and to several theoretical models.

PB80-195068 PC **A10**/MF **A01**
Texas Dept. of Water Resources, Austin.
Occurrence, Quality, and Quantity of Ground Water in Wilbarger County, Texas,
Robert D. Price. Nov 79, 221p TDWR/R-240
Color illustrations reproduced in black and white.

The water needs of the county are supplied almost entirely from ground water. The water-bearing units listed in their order of importance are: the Seymour Formation, Quaternary alluvium deposits, and the rocks of the Permian System. The Seymour Formation and Quaternary alluvium deposits are hydrologically connected and usually function as a single aquifer. The yields of the wells range from small to moderate. The quality of their ground waters ranges from fresh to very saline. Ground waters of the Clear Fork Group of Permian age are of small yields and are usually highly mineralized. The San Angelo Formation of Permian age reliably yields fresh to slightly saline ground water in small quantities. The native ground water in the principal aquifer in the county, although very hard, is of good quality. Water from this aquifer is suitable for public supplies, irrigation, livestock, and limited industrial uses.

PB80-195589 PC **A23**/MF **A01**
Geological Survey, Madison, WI. Water Resources Div.
Water Resources Data for Wisconsin, Water Year 1979.
Water-data rept. (Annual) 1 Oct 78-30 Sep 79. Apr 80, 530p USGS/WRD/HD-80/029, USGS-WDR-WI-79-1
Prepared in cooperation with Wisconsin Dept. of Natural Resources, Madison, Wisconsin Dept. of Transportation, Madison, Wisconsin Univ.-Extension, Madison, and Southeastern Wisconsin Regional Planning Commission, Waukesha. See also report for Water Year 1978, PB80-116049.

Water-resources data for the 1979 water year for Wisconsin include records of streamflow at gaging stations, partial-record stations, and miscellaneous sites; records of reservoir storage, records of chemical, physical, and biological characteristics of surface water, ground water, and precipitation, and records of water levels in observation wells.

PB80-195803 PC **A16**/MF **A01**
Geological Survey, Lawrence, KS. Water Resources Div.
Water Resources Data for Kansas, Water Year 1979. Volume 1. Missouri River Basin.
Water-data rept. (Annual) 1 Oct 78-30 Sep 79. Apr 80, 370p USGS/WRD/HD-80/023, USGS-WDR-KS-79-1
See also report for Water Year 1978, PB-293 528.

Water resources data for the 1979 water year for Kansas consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality in wells. This report contains discharge records for 83 gaging stations; stage and contents for 14 lakes and reservoirs; water quality for 46 gaging stations and 2 lakes; and water levels for about 236 observation wells and water quality for about 265 wells. Also included are data for 62 crest-stage partial-record stations.

PB80-195928 PC **A24**/MF **A01**
Geological Survey, Albany, NY. Water Resources Div.
Water Resources Data for New York, Water Year 1979. Volume 1. New York Excluding Long Island.
Water-data rept. (Annual) 1 Oct 78-30 Sep 79. May 80, 572p USGS/WRD/HD-80/032, USGS-WDR-NY-79-1
See also report for Water Year 1978, PB-296 419.

Water resources data for the 1979 water year for New York consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground-water wells. This volume contains records for water discharge at 187 gaging stations; stage only at 22 gaging stations; stage and contents at 12 gaging stations and 18 other lakes and reservoirs; water quality at 60 gaging stations and 43 wells; and water levels at 44 observation wells. Also included are data for 133 crest-stage and 15 low-flow partial-record stations.

PB80-195936 PC **A16**/MF **A01**
Geological Survey, Huron, SD. Water Resources Div.
Water Resources Data for South Dakota, Water Year 1979.
Water-data rept. (Annual) 1 Oct 78-30 Sep 79. May 80, 362p USGS/WRD/HD-80/030, USGS-WDR-SD-79-1
See also report for Water Year 1978, PB-296 426.

Water resources data for the 1979 water year for South Dakota consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels in wells. This report contains discharge records for 109 gaging stations; stage and contents for 10 lakes and reservoirs; water quality for 22 gaging stations and 62 wells; and water levels for 16 observation wells. Also included are 97 crest-stage partial-record stations.

PB80-196065 PC **A99**/MF **A01**
Geological Survey, Austin, TX. Water Resources Div.
Water Resources Data for Texas, Water Year 1978. Volume 3. Colorado River Basin, Lavaca River Basin, Guadalupe River Basin, Nueces River Basin, Rio Grande Basin, and Intervening Coastal Basins.
Water-data rept. 1 Oct 77-30 Sep 78. Oct 79, 609p USGS/WRD/HD-80/002, USGS-WDR-TX-78-3
See also Volume 3 for Water Year 1976, PB-287 957.

Surface-water data for the 1978 water year for Texas are presented in three volumes, appropriately identified as to content by river basins. Data in each volume consist of records of stage, discharge, and water quality of streams and canals;

and stage, contents, and water quality of lakes and reservoirs. Also included are crest-stage and flood-hydrograph partial-record stations, reconnaissance partial-record stations, and low-flow partial-record stations.

PB80-197007 PC **A02**
National Environmental Satellite Service, Washington, DC.
Satellites as Aid to Water Resource Managers,
David F. McGinnis, Jr., Roderick A. Scofield, Stanley R. Schneider, and Craig P. Berg. Mar 80, 21p NOAA-80051905
Pub. in Jnl. of the Water Resources Planning and Management Division, ASCE, v106 nWR1, Proc. Paper 15244 p1-19 Mar 80.

Satellite imagery and digital data have been applied to solve water resource problems. Areal snowcover determinations, monitoring of river ice breakup, mapping of flood extent, and precipitation estimates have been derived from polar-orbiting and geostationary satellite data. The operational snowmapping program at the National Environmental Satellite Service provides snowcover data to requesting Federal, State and local agencies for use in reservoir release decisions, water resource planning, flood forecasting, and runoff modelling. Satellite data can be used to monitor ice breakup on major river systems. During April 4-14, 1976, lengths of individual ice-covered reaches on Canada's Ottawa River were measured daily. Major floods in the United States have been observed on satellite imagery and flood-extent maps produced. Case studies are presented for the Mississippi River flood of 1973 and the Red River of the North flood of 1978.

PB80-198656 PC **A02**/MF **A01**
National Weather Service, Salt Lake City, UT. Western Region.
Flash-Flood Procedure,
Donald P. Laurine, and Ralph C. Hatch. Apr 80, 12p NOAA-NWS-WRCP-10, NOAA-80051303
See also report dated May 78, PB-286 014.

This program calculates peak flows for storms that produce heavy precipitation over short periods of time, for small streamflow basins (generally less than 200 square miles). The program written in Fortran is currently designed to run on the Data General Eclipse.

PB80-216708 PC **A06**/MF **A01**
Indiana Univ. at Bloomington. Dept. of Geology.
Inorganic Chemistry of Urban Runoff and Hydrologic Relationships, Bloomington, Indiana.
Master's thesis,
David W. Clark. Oct 79, 103p W80-05402, OWRT-C-7681(7256)(2)

Identification and quantification of key pollutants and the impact of storm-water runoff was carried out in the karst-controlled landscape of Bloomington, Indiana, and surrounding suburban and agricultural areas. Water quality data were obtained from 10 gaging stations and 5 subsites before and after rainfalls of differing intensities and duration. Concentrations of NO3, NH3, PO4, F, K, Fe, and Mn were increased at the sewage treatment plant and storm sewer outfalls and for several miles downstream. Values of Na, Cl, SO4, conductivity, and Zn were highest in the runoff from the most developed areas. There were no increases of NO3, NH3, PO4, and suspended sediment correlating to an increased proportion of impervious cover.

8I. Mining Engineering

BNL-51112 PC **A05**/MF **A01**
Burns and Roe Industrial Services Corp., Paramus, NJ.
Economic Assessment of Using Nonmetallic Materials in the Direct Utilization of Geothermal Energy. Final Report.
S. V. Cabibbo, and T. Ammerlaan. Feb 79, 86p
Contract EY-76-C-02-0016

The cost effectiveness of nonmetallic materials in three direct-use geothermal applications was assessed. An extensive review of the available literature was conducted in order to ascertain those processes for which sufficient design and cost data had been published to permit this economic assessment to be made. Only three such processes could be found and they are discussed. (ERA citation 05:022268)

CONF-7906154- PC **A15**/MF **A01**
Department of Energy, Washington, DC. Div. of Fossil Fuel Extraction.
Symposium on Enhanced Oil Recovery in the Year 2000.
V. Kuuskraa, and C. Flores. Dec 79, 338p
Contract ET-78-C-01-2628
Symposium on technology of enhanced oil recovery in the year 2000, Williamsburg, VA, USA, 28 Jun 1979.

The symposium comprises three sessions: enhanced oil recovery from heavy oil reservoirs; enhanced oil recovery from light oil reservoirs; and enhanced oil recovery from special target reservoirs. The 13 papers presented at the symposium were processed individually. (ERA citation 05:021745)

DOE/ET/12051-1 PC **A10**/MF **A01**
Petroleum Technology Corp., Redmond, WA.
Chemical Explosive Fracturing Devonian Shale and Canyon Sands. Final Report, 1 July 1976-31 December 1979.
Dec 79, 210p
Contracts AC08-76ET12051, AC08-76ET12052

The Devonian shale resource which underlies much of Appalachia and was the formation of interest in Kentucky and West Virginia is discussed. The CEF process is described which consists of pumping two non-detonable chemical streams down the well bore to a mixer where the liquid explosive is manufactured. The explosive is displaced down the tubing to the bottom of the well and out into the formation rock. It detonates in thin films as well as in the borehole thus fracturing the rock and increasing the permeability. Site selection, pre and post shot flow tests, cleanout and production results are presented. The problems encountered are discussed. Evaluation led to modified and improved placement, initiation, and cleanout techniques. Projected costs for the improved simulation and cleanout technique are presented. Additional tests to determine the caging/springing effect in the borehole are planned by Petroleum Technology Corporation. (ERA citation 05:021798)

DOE/ET/27017-T1 PC **A04**/MF **A01**
New Mexico Univ., Albuquerque.
Economic Factors Relevant for Electric Power Produced from Hot Dry Rock Geothermal Resources: A Case Study for the Fenton Hill, New Mexico, Area.
R. G. Cummings, G. Morris, C. J. Arundale, and E. L. Erickson. Dec 79, 52p
Contract AS04-79ET27017

The case study described here concerns an HDR system which provides geothermal fluids for a hypothetical electric plant located in the Fenton Hill area in New Mexico's Jemez Mountains. Primary concern is focused on the implications of differing drilling conditions, as reflected by costs, and differing risk environments for the potential commercialization of an HDR system. Drilling costs for best, medium and worst drilling conditions are taken from a recent study of drilling costs for HDR systems. Differing risk environments are represented by differing rate-of-return requirements on stocks and interest on bonds which the HDR system is assumed to pay; rate of return/interest combinations considered are 6%/3%, 9%/6%, 12%/9% and 15%/12%. The method of analysis used here is that of determining the minimum busbar cost for electricity for this case study wherein all costs are expressed in annual equivalent terms. The minimum cost design for the electric generating plant is determined jointly with the minimum cost design for the HDR system. The interdependence between minimum cost designs for the plant and HDR system is given specific attention; the optimum design temperature for the plant is shown here to be lower than one might expect for conventional power plants - in the range 225 exp 0 to 265 exp 0 C. Major results from the analyses of HDR-produced electricity in the Fenton Hill area are as follows. With real, inflation-free debt/equity rates of 6% and 9%, respectively, the minimum busbar cost is shown to lie in the range 18 to 29 mills/kwh. When real debt/equity rates rise to 12% and 15%, busbar costs rise to 24 to 39 mills/kwh. (ERA citation 05:022259)

DOE/EV/10286-4 PC **A03**/MF **A01**
Hart (Fred C.) Associates, Inc., New York.
Analysis of the Office of Surface Mining Estimates of the Cost of Implementing the Surface Mining Control and Reclamation Act.
Dec 79, 29p
Contract AC02-79EV10286

This report has focused on the adequacy of OSM's cost estimates for implementation of SMCRA's discretionary regulations. In considering whether the Regulatory Analysis included the proper regulations and subparts we determined that only three discretionary regulations were not assessed in the RA. Our analysis of the model mine data base concluded that D'Appolonia Consulting Engineers used sound bases for their cost estimates. There were no apparent methodological errors. In estimating the costs of those additional discretionary regulations which should have been included in the Regulatory Analysis, only one such regulation was found to have a significant or measureable implementation cost. While this cost should have been included in OSM's cost estimate, it amounts to an increase of only three percent in the estimated cost of complying with the discretionary regulations. The Regulatory Analysis should be viewed in its proper light. It is an attempt to estimate the cost of complying with SMCRA's discretionary regulations. It is not an attempt to measure the total cost of implementing SMCRA. It has been shown to be, generally, an accurate analysis. (ERA citation 05:020044)

DOE/METC/10866-10 PC **A03**/MF **A01**
Geological Survey, Reston, VA.
Chattanooga Shale (Devonian and Mississippian) from the Tennessee Division of Geology - US Department of Energy Cored Drill Hle Number 3, Hancock County, Tennessee.
J. B. Roen, R. C. Milici, and L. G. Wallace. May 80, 38p
Contract AI21-79MC 10866

This report presents a detailed lithologic description and gamma-ray log of the drill hole which is located on the Calvert Johnson property in the Sneedville 7.5-minute quadrangel, Hancock County. (ERA citation 05:021791)

DPST-80-146-15 PC **E02**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Mesa NTMS 1 exp 0 X 2 exp 0 Quadrangle Area. Supplemental Data Report.
G. R. Koller. Jan 80, 61p
Contract EY-76-C-09-0001

This data report presents supplemental analytical results for stream sediments and ground water. The samples were collected as part of the SRL-NURE reconnaissance in the National Topographic Map Series (NTMS) Mesa 1 exp 0 x 2 exp 0 quadrangle. Results are reported for 24 elements (Ag, As, Ba, Be, Ca, Co, Cr, Cu, K, Li, Mg, Mo, Nb, Ni, P, Pb, Se, Sn, Sr, Th, W, Y, Zn, and extractable U) in sediments and 31 elements (Ag, Al, As, B, Ba, Be, Ca, Ce, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Sc, Se, Si, Sr, Th, Ti, V, Y, Zn, and Zr) as well as pH, alkalinity, and conductivity in ground water. (ERA citation 05:021826)

FE-78-8969-1 PC **A03**/MF **A01**
Alaska Univ., Fairbanks. Mineral Industry Research Lab.
Characterization and Evaluation of Washability of Alaskan Coals: Selected Seams from Nenana, Jarvis Creek and Matanuska Coal Fields. Final Technical Report for Phase I, September 30, 1976-June 30, 1977.
P. Dharma Rao, and E. N. Wolff. May 79, 38p
Contract ET-78-G-01-8969

This report covers the results of a study conducted to obtain washability data for Alaskan coals to supplement the efforts of the US Department of Energy (formerly US Bureau of Mines) in its ongoing studies on washability of US coals. Alaska has 130 billion tons of identified coal resources

and could be in a position to supply environmentally acceptable low-ash and low-sulfur coals to other states. Preparation characteristics were obtained for nine coal samples collected from the Nenana, Jarvis Creek, and Matanuska coal fields. The raw coals were crushed to 1 1/2 inches, 3/8 inch, and 14 mesh (Tyler) sizes and float-sink separations were made at 1.30, 1.40, and 1.60 specific gravities. The results showed that six subbituminous C coals from the Nenana coal field, when crushed to minus 14 mesh and floated at specific gravity 1.40, yielded products ranging in heating values from 10,098 to 11,664 Btu/lb with 0.15 percent to 0.23 percent sulfur on a moisture free basis, making them among the most environmentally acceptable coals in the United States. A subbituminous C coal from the Jarvis Creek coal field yielded 84.9 weight-percent of float 1.40 specific gravity product with 11,272 Btu/lb on a moisture free basis and 0.98 percent sulfur after crushing to 14 mesh top size. A high volatile A and a high volatile B bituminous coal from the Matanuska coal field yielded 65.7 and 75.3 weight-percent of float 1.40 specific gravity product with heating values of 14,383 and 13,371 Btu/lb when crushed to 14 mesh top size. The sulfur in these two coals was very low (less than 0.50 percent) and was virtually all organic sulfur; therefore, no sulfur reduction occurred during washing. (ERA citation 05:021715)

GJBX-31(80) MF **A01**
Bendix Field Engineering Corp., Grand Junction, CO.
Brushy Basin Drilling Project, Cedar Mountain, Emergy County, Utah.
K. D. Kiloh, M. McNeil, and H. Vizcaino. Mar 80, 53p
Contract EY-76-C-13-1664
Microfiche copies only.

A 12-hole drilling program was conducted on the northwestern flank of the San Rafael swell of eastern Utah to obtain subsurface geologic data to evaluate the uranium resource potential of the Brushy Basin Member of the Morrison Formation (Jurassic). In the Cedar Mountain-Castle Valley area, the Brushy Basin Member consists primarily of tuffaceous and carbonaceous mudstones. Known uranium mineralization is thin, spotty, very low grade, and occurs in small lenticular pods. Four of the 12 drill holes penetrated thin intervals of intermediate-grade uranium mineralization in the Brushy Basin. The study confirmed that the unit does not contain significant deposits of intermediate-grade uranium. (ERA citation 05:020099)

GJBX-50(80) PC **A02**/MF **A01**
Bendix Field Engineering Corp., Grand Junction, CO.
Engineering Report on the Great Divide Basin Drilling Project, Sweetwater County, Wyoming.
P. Ferrell, and H. Vizcaino. Apr 80, 11p
Contract EY-76-C-13-1664

This report presents engineering details, logistics, and individual borehole histories of six holes drilled in the Great Divide Basin Sweetwater County, Wyoming. The objective was to test the uranium potential of the Battle Spring Formation (Tertiary) where the unit contains uraniferous carbonaceous shales and mudstones. Drilling began September 6, 1979, and was completed September 13, 1979. (ERA citation 05:020101)

GJBX-58(80) MF **A01**
Western Geophysical Co. of America, Houston, TX. Aero Service Div.
Airborne gamma-Ray Spectrometer and Magnetometer Survey: Platoro Caldera Detail Survey, Durango Quadrangle (Colorado). Final Report.
Feb 80, 98p
Contract EY-76-C-13-1664
Microfiche copies only.

Between October 18 and November 7, 1978, a high sensitivity airborne gamma-ray spectrometer and magnetometer survey was conducted over the Durango Detailed Survey Area No. 3, which is centered about 20 miles northeast of Pagosa Springs, Colorado and located within the San Juan Mountains. The study was carried out as part of the Aerial Radiometric and Magnetic Reconnaissance Survey Program, designed to map the regional distribution of the natural radioelements for the principal rock units of the United States in support of the National Uranium Resource Evaluation (NURE) program. (ERA citation 05:021828)

LA-UR-80-742 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Subterranean Stress Engineering Experiments.
J. R. Campbell, S. A. Colgate, and B. M. Wheat. 1980, 15p CONF-800522-1
Contract W-7405-ENG-36
13. symposium on rock mechanics, Ontario, Canada, 28 May 1980.

The state of stress in a subterranean rock mass has classically been assumed to be constant at best. In soil with a high clay content, preconsolidation and drainage methods can lead to more stable foundation material, but methods for engineering the stresses in large masses of rock are not well known. This paper shows the results from an experiment designed to alter the in situ rock stress field in an oil shale mine. This was done by hydrofracturing the rock by use of a packed-well injection system and then propping the crack open with a thixotropic gel, which slowly hardened to the consistency of cement. Successive hydrofracture and high-pressure grouting resulted in an overstressed region. Well-head injection pressures, surface tilts, injection rates, and subterranean strains were measured and recorded on floppy disk by a Z-80 microprocessor. The results were then transmitted to the large computer system at the Los Alamos Scientific Laboratory (LASL). To put the data in a more useful form, computer-generated movies of the tilts and strains were made by use of computer graphics developed at LASL. The purpose of this paper is to present results from the Single Large Instrumented Test conducted in the Colony Oil Shale Mine near Rifle, Colorado. 13 figures. (ERA citation 05:021051)

LA-8254-MS PC **E03**/MF **A01**
Dresser Atlas, Houston, TX.
Geophysical Well Logging Operations and LOG Analysis in Geothermal Well Desert Peak No. B-23-1.
D. K. Sethi, and W. H. Fertl. Mar 80, 76p
Contract W-7405-ENG-36

Geothermal Well Desert Peak No. B-23-1 was logged by Dresser Atlas during April/May 1979 to a total depth of 2939 m (9642 ft). A temperature of 209 exp 0 C (408 exp 0 F) was observed on the maximum thermometer run with one of the logging tools. Borehole tools rated to a maximum temperature of 204.4 exp 0 C (400 exp 0 F) were utilized for logging except for the Densilog tool, which was from the other set of borehole instruments, rated to a still higher temperature, i.e., 260 exp 0 C (500 exp 0 F). The quality of the logs recorded and the environmental effects on the log response have been considered. The log response in the unusual lithologies of igneous and metamorphic formations encountered in this well could be correlated with the drill cutting data. An empirical, statistical log interpretation approach has made it possible to obtain meaningful information on the rocks penetrated. Various crossplots/histograms of the corrected log data have been generated on the computer. These are found to provide good resolution between the lithological units in the rock sequence. The crossplotting techniques and the statistical approach were combined with the drill cutting descriptions in order to arrive at the lithological characteristics. The results of log analysis and recommendations for logging of future wells have been included. (ERA citation 05:022257)

NVO-218 PC **A04**/MF **A01**
Department of Energy, Las Vegas, NV. Nevada Operations Office.
Mt. Hood Geothermal Exploratory Drilling and Testing Plan. Old Maid Flat Holes No. 1 and No. 7A.
May 80, 72p

This plan has been prepared to establish the objectives and set forth the procedures and guidelines for conducting geothermal exploratory drilling and testing operations in the Old Maid Flat area of Mt. Hood, Oregon, approximately 50 miles east of Portland. The project will be conducted on lands within the Mt. Hood National Forest, which are currently under Federal Lease OR 13994 to the Northwest Geothermal Corporation. The exploratory geothermal operations will consist of (1) testing an existing 4,000-foot temperature gradient hole to determine the quality of geothermal fluids, and (2) drilling and testing a new 5,000-foot hole to determine overall geothermal reservoir characteristics. (ERA citation 05:022258)

N80-25764/5 PC **A04**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Economic Baselines for Current Underground Coal Mining Technology.
Final Report.
W. B. Mabe. 15 Dec 79, 65p NASA-CR-163259, JPL-PUB-79-122
Contracts NAS7-100, ET-75-1-01-9036

The cost of mining coal using a room pillar mining method with continuous miner and a longwall mining system was calculated. Costs were calculated for the years 1975 and 2000 time periods and are to be used as economic standards against which advanced mining concepts and systems will be compared. Some assumptions were changed and some internal model stored data was altered from the original calculations procedure chosen, to obtain a result that more closely represented what was considered to be a standard mine. Coal seam thicknesses were varied from one and one-half feet to eight feet to obtain the cost of mining coal over a wide range. Geologic conditions were selected that had a minimum impact on the mining productivity.

PAT-APPL-6-018 198 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Improvements in Geothermal Electric Power and Silica Production.
Patent Application,
J. H. Hill, and M. M. Fulk. Filed 6 Mar 79, 22p
Contract W-7405-ENG-48
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Electricity is generated from hot geothermal solution by extracting heat therefrom, mineral solids which form in a so cooled geothermal solution are separated to recover minerals and facilitate reinjection of the solution into the ground. The separated solids are treated to recover silica by addition of an acid (amorphous silica precipitates) or a base (other minerals precipitate and soulble silicates are formed which are subsequently precipitated by acid neutralization). If desired, after silica is separated, other minerals can be separated and recovered. (ERA citation 05:023991)

PB80-809197 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Mine Hoists and Hauling. 1970-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1970-Apr 80,
Robert Hippler. May 80, 195p
Sponsored in part by National Technical Information Service, Springfield, VA.

Mine hoists and hauling equipment, and practices, are covered in the cited abstracts. Equipment design, construction and use, and safety and emergency escape are included. Mine conveyer systems for people, equipment, coal, rock, and other materials are described. Mine practices and procedures, as they relate to hauling, lifting and conveying, are mentioned. (Contains 177 citations)

PB80-812902 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Offshore Drilling. 1976-June, 1980 (Citations from the NTIS Data Base).
Rept. for 1976-Jun 80,
Guy E. Habercom, Jr. Jul 80, 214p
Supersedes NTIS/PS-79/0793 and NTIS/PS-78/0749. See also 1964-1975, NTIS/PS-78/0748.

Drilling procedure, equipment, environmental aspects, and legal implications involved in oceanic mineral resources recovery are investigated. (This updated bibliography contains 202 citations, 44 of which are new entries to the previous edition.)

SAN-2044-1 PC **A09**/MF **A01**
Vetter Research, Costa Mesa, CA.

Injection, injectivity and injectability in Geothermal Operations: Problems and Possible Solutions. Phase I. Definition of the Problems.
O. J. Vetter, and H. B. Crichlow. 14 Feb 79, 183p
Contract ET-78-C-03-2044

The following topics are covered: thermodynamic instability of brine, injectivity loss during regular production and injection operations, injectivity loss caused by measures other than regular operations, heat mining and associated reservoir problems in reinjection, pressure maintenance through imported make-up water, suggested solutions to injection problems, and suggested solutions to injection problems: remedial and stimulation measures. (ERA citation 05:022264)

SAN-2121-5 PC **A04**/MF **A01**
JM Energy Consultants, Inc., Los Angeles, CA.
Geothermal Development and Land Use/ Energy Planning by the State of California and its Political Subdivisions.
30 Jul 78, 61p
Contract ET-78-C-03-2121

California law contains several vehicles for the implementation of geothermal planning. These mechanisms and their impact are examined. First, at the State level upon the California Energy Commission and the Division of Oil and Gas in the Department of Conservation. After some background on county planning in California, the unique situation in the counties of greatest geothermal potential is presented: Imperial County and the four Geysers counties as well as their joint powers agency. Conclusions and recommendations are included. (ERA citation 05:020476)

SAND-79-2254C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Measurements of Very Large Deformations in Potash Salt in Conjunction with an Ongoing Mining Operation.
A. R. Sattler, and C. L. Christensen. 1980, 10p CONF-800507-4
Contract EY-76-C-04-0789
Rock mechanics symposium, Rolla, MO, USA, 27 May 1980.

Room and pillar deformation were measured in conjunction with a relatively new type of mining operation in a southeastern New Mexico potash mine. The extraction ration was approximately 90 percent in a first mining operation. Due to severe deformations encountered, instrumentation had to be developed/modified for these measurements. This paper concentrates on experiment design, design of special instrumentation, field installation of equipment, and presentation of the data. Measurements made include extensometers in the pillar, in the floor and ceiling in the room between pillars, absolute level measurements, floor ceiling closure, and stress (strain) measurements. Associated laboratory rock mechanics measurements of samples from the mine are being done separately. Two separate room pillar complexes were instrumented. In the first complex, floor-ceiling deformations of approximately 1 inch/day and pillar deformations around 1/2 inch/day were measured. In the second complex, instrumentation was installed while the pillar was a part of a long wall and the subsequent sequential mining (long wall-pillar with only one adjoining room on one side - pillar in the middle of room pillar complex) was observed. Data return from this operation was good. (ERA citation 05:020187)

SAND-80-0077C MF **A01**
Society of Petroleum Engineers, Dallas, TX.
In-Situ Stresses: The Predominant Influence on Hydraulic Fracture Containment.
N. R. Warpinski, R. A. Schmidt, and D. A. Northrop. 1980, 20p CONF-800525-2
Contract EY-76-C-04-0789
SPE/DOE symposium on unconventional gas recovery, Pittsburgh, PA, USA, 18 May 1980.
Microfiche copies only.

In situ experiments, which are accessible by mineback, have been conducted to examine the parameters that control hydraulic fracture containment. These experiments show conclusively that material property differences at an interface are insufficient to arrest crack growth. Present models that predict the fracture should be contained at the interface because the stress intensity factor at the fracture tip goes to zero as the interface is approached are inadequate, and an improvement is suggested. However, sharp increases in the minimum principal in situ stress (as may occur at faults) and steep gradients in that stress have been shown to be effective barriers to crack propagation. Examples of fractures terminating at faults and parting planes illustrate how discontinuities in the in situ stress can arrest fracture growth. Furthermore, experiments were conducted in a formation which contained a steep gradient in the minimum principal in situ stress and which was overlain by a formation with a factor of five greater modulus. In each case, fractures were observed to terminate at regions of high minimum principal stress but to propagate readily into the higher modulus formation. (ERA citation 05:021799)

SAND-80-0398 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
BORE: A Computer Program for the Calculation of Wellbore Heat Loss.
C. E. Hickox. Mar 80, 38p
Contract EY-76-C-04-0789

The computer program BORE is used for the analysis of steam injection into typical wellbores. The steam flow is assumed to be one-dimensional with quasi-steady heat transfer occurring only in the radial direction. Analyses are restricted to cases for which the steam quality is between zero and 100%. The basic geometry treated consists of an insulated injection tube situated concentrically within a casing and separated from the casing by an air gap. The casing is, in turn, surrounded by a layer of cement and is embedded in a formation which is infinite in extent. Steam quality, temperature, and enthalpy are computed as functions of depth for specified geometry, inlet flow conditions, and thermophysical properties. (ERA citation 05:021763)

8J. Physical Oceanography

AD-A085 384/6 PC **A02**/MF **A01**
Lamont-Doherty Geological Observatory Palisades NY
Tests for Size and Shape Dependency in Deep-Sea Mixing.
Journal article,
W. F. Ruddiman, G. A. Jones, T.-H. Peng, L. K. Glover, and B. P. Glass. 21 May 80, 21p Rept no. LDGO-2957
Contract N00014-75-C-0210
Pub. in Sedimentary Geology, v25 p257-276 1980.

No abstract available.

AD-A085 526/2 PC **A02**/MF **A01**
Coastal Engineering Research Center Fort Belvoir VA
Computation of Longshore Energy Flux Using LEO Current Observations.
Coastal engineering technical aid rept.,
Todd L. Walton, Jr. Mar 80, 16p Rept no. CERC-CETA-80-3

A computational technique is presented for the longshore energy flux factor, P sub ls, using current observations from the Littoral Environment Observation (LEO) program. Chapter 4 of the Shore Protection Manual (SPM) gives various equations for P sub ls as a function of wave height, wave period, and breaking wave angle. The present report details how P sub ls can be calculated using longshore current and breaking wave height data only. An example problem is given for this method. (Author)

PB80-199490 PC **A99**/MF **A01**
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorological Labs.
Collected Reprints 1978, Atlantic Oceanographic and Meteorological Laboratories, Miami, Florida.
Dec 79, 643p NOAA-80050904
See also Volume 1, PB-294 452.

The Atlantic Oceanographic and Meteorological Laboratories conduct research programs in the areas of physical, chemical, and geological oceanography, and sea-air interaction. Collected Reprints from these laboratories have been published for distribution to the libraries of scientific institutions here and abroad annually since the laboratories were established in 1965.

8K. Seismology

AD-A085 775/5 MF **A01**
Atomic Weapons Research Establishment Aldermaston (England)
Earthquake Focal Mechanisms from Relative Amplitudes of P, pP and sP: Method and Computer Program,
R. G. Pearce. Aug 79, 107p AWRE-O-41/79, DRIC-BR-69944
Availability: Microfiche copies only.

This report describes a FORTRAN computer program which determines the orientation (with confidence limits) of an assumed double couple earthquake source, given a series of teleseismically observed relative amplitudes, each of which relates the amplitudes of either P and p superscript p and sP, or p superscript P and sP on one seismogram. Appropriate upper and lower limits are assigned in arbitrary units to the observed amplitude of each phase, with or without a polarity specification, and from these limits the program computes the corresponding range(s) of relative amplitudes for each pair of phases. All source orientations which are compatible with the range(s) of relative amplitudes are then identified, and can be displayed graphically. Those orientations which are compatible with all pairs of phases at all stations constitute the focal mechanism solution, with confidence limits which correspond directly to the confidence of the initial measurements. The program can be applied to shallow or deep earthquakes beneath land or sea. (Author)

LA-8270-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Intermediate Simulation of the Inverse Seismic Problem.
J. E. Brolley. Mar 80, 22p
Contract W-7405-ENG-36

An introductory study of the inverse seismic problem is performed. The complex cepstrum of a seismogram generated by the convolution of three factors, the Seggern-Blandford source function of an explosion, the Futterman mantle transfer function, and the SRO seismometer transfer function, is used. For a given Q and yield, a synthetic seismogram is computed. Arbitrary values of Q and yield are introduced, and a search is conducted to find that pair of values that minimized the cepstral difference between the original and arbitrary seismograms. The original values are accurately recovered. Spectral and amplitude characteristics of the various factors are presented. Possible application to the problem of studying a medium intervening between a source and receiver is discussed. 25 figures, 1 table. (ERA citation 05:021365)

NUREG/CR-1500 PC **A05**/MF **A01**
Oklahoma Geological Survey, Norman.
Seismicity and Tectonic Relationships of the Nemaha Uplift in Oklahoma, Part III.
Technical rept.,
Kenneth V. Luza, and James E. Lawson, Jr. Jun 80, 80p
See also Part 2, NUREG/CR-0875.

Structure-contour maps of the top of the Viola Formation (Ordovician), base of the Pennsylvanian, and top of the Oswego Formation (Middle Pennsylvanian) were completed for the Enid and Oklahoma City 1 degree x 2 degree Quadrangles. Detailed gravity and magnetic studies were completed for the Kingfisher and Medford maxima, north-central Oklahoma. An aeromagnetic map was prepared for the Enid and Oklahoma City 1 degree x 2 degree Quadrangles from NURE data. Seismological studies included (1) a microearthquake study near Wilson, Oklahoma, (2) frequency-magnitude evaluation of the Wilson microearthquake data, and (3) magnitude determinatior.s from earthquake felt-area reports for 25 historical Oklahoma earthquakes.

8L. Snow, Ice, and Permafrost

AD-A085 512/2 MF **A01**
Leschack Associates Ltd Silver Spring MD

Correlation of Under-Ice Roughness with Satellite and Airborne Thermal Infrared Data.
Technical rept.,
Leonard A. LeSchack. May 80, 46p Rept no. TR-2
Contract N00014-76-C-0757
Availability: Microfiche copies only.

This report, based on empirical data, concludes that a correlation has been found between easily obtainable sea ice surface temperature and under-ice roughness data which are obtainable only at great expense. Under-ice roughness is valuable in evaluating acoustic attenuation beneath the Arctic ice and is expressed in terms of either root-mean-square (RMS) ice depth or standard deviation about the mean ice depth, both of which are closely correlated. By showing a functional relationship between the skewness of the surface temperature distribution as derived from NOAA VHRR Satellite thermal infrared data and the under-ice roughness, the way appears clear to make a chart of Arctic under-ice roughness for Arctic acoustic programs and for nuclear submariners. In a second study, under ice data recorded in April 1976 by the SSN GURNARD was correlated with the skewness of temperature distributions derived from NOAA VHRR IR data recorded in March 1976 over nominally the same area of the Beaufort Sea. A third study was then conducted that shows, perhaps more graphically than the others, the correlation of under-ice data recorded by the British nuclear submarine HMS SOVEREIGN between 18-21 October 1976 with airborne IR data recorded during the same period over the submarine track by a Canadian Forces Argus aircraft. In all three examples, when the RMS ice depth range was between 4 and 8 m, corresponding to a standard deviation of ice depth ranging between 2 and 6 m, there is a strong, negative linear correlation between the skewness of the temperature distributions, whether measured from satellites or aircraft, and the under-ice roughness measured by submarine upward-looking sonar.

N80-25761/1 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
The Albedo of Snow for Partially Cloudy Skies.
B. J. Choudhury, and A. T. C. Chang. Apr 80, 36p NASA-TM-80649
Submitted for Publication.

The input parameters of the model are atmospheric precipitable water, ozone content, turbidity, cloud optical thickness, size and shape of ice crystal of snow and surface pressure. The model outputs spectral and integrated solar flux snow reflectance as a function of solar elevation and fractional cloudcover. The model is illustrated using representative parameters for the Antarctic coastal regions. The albedo for a clear sky depends inversely on the solar elevation. At high elevation the albedo depends primarily upon the grain size; at low elevation this dependence is on grain size and shape. The gradient of the albedo-elevation curve increases as the grains get larger and faceted. The albedo for a dense overcast is a few percent higher than the clear sky albedo at high elevations. A simple relation between the grain size and the overcast albedo is obtained. For a set of grain size and shape, the albedo matrices (the albedo as a function of solar elevation and fractional cloudcover) are tabulated.

N80-25763/7 PC **A05**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
Overseas Trip Report, Cv 990 Underflight Mission.
P. Gloersen, J. Crawford, and L. Hardis. Mar 80, 95p NASA-TM-80662

The scanning microwave radiometer-7 simulator, the ocean temperature scanner, and an imaging scatterometer/altimeter operating at 14 GHz were carried onboard the NASA CV-990 over open oceans, sea ice, and continental ice sheets to gather surface truth information. Data flights were conducted over the Norwegian Sea to map the ocean polar front south and west of Bear Island and to transect several Nimbus-7 footprints in a rectangular pattern parallel to the northern shoreline of Norway. Additional flights were conducted to obtain correlative data on the cryosphere parameters and characteristics of the Greenland ice sheet, and study the frozen lakes near Barrow. The weather conditions and flight path way points for each of the nineteen flights are presented in tables and maps.

PB80-197015 PC **A02**
National Environmental Satellite Service, Washington, DC.
Satellite Studies of Fresh-Water Ice Movement on Lake Erie.
Donald R. Wiesnet. 1979, 12p NOAA-80051903
Pub. in Jnl. of Glaciology, v24 n90 p415-426 1979.

Ice formation, movement, and break-up in Lake Erie are different in each sub-basin, Western, Central, and Eastern, owing to the variation in depth of water, geomorphology, and meteorologic factors. Ice movement after initial break-up in 1974-77 resulted in the accumulation of ice at the entrance of the Niagara River at the eastern end of the lake. In 1973, satellite images show the unusual development of an ice dam across the entire width of Lake Erie and the 'ice plug' at the mouth of the Niagara did not form. The effect of wind direction on break-up patterns is seen to be critical to any attempt at forecasting date of complete ice melt as well as day-to-day distribution of ice. Satellite observation of ice in Lake Erie--and in all large lakes--provides information regularly, routinely, and synoptically form a point in space.

PB80-197023 PC **A02**
National Environmental Satellite Service, Washington, DC.
A Satellite Mosaic of the Greenland Ice Sheet.
D. R. Wiesnet. 1980, 8p NOAA-80051904
Pub. in World Glacier Inventory (Proceedings of the Riederalp Workshop, Sep 78): OAHS-AISH Pub. n126 p343-348 1980.

The Satellite Image Atlas of Glaciers of the World project, sponsored by the U.S. Geological Survey has given impetus to the use of satellite data for glacier studies. The NOAA-5 polar-orbiting satellite's 900 m resolution is well suited for monitoring the Greenland ice sheet. Several computer enhanced and rectified satellite-derived mosaics of the ice sheet are presented and discussed. Analysis of the satellite imagery indicates possible relationships between temperature and topography as well as the possibility of recording the position of the firn line.

8M. Soil Mechanics

PB80-193733 PC **A05**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. Natural Economics Div.
Operator and Landlord Participation in Soil Erosion Control in the Maple Creek Watershed in Northeast Nebraska.
Staff rept.,
Herbert Hoover, and Marc Wiitala. Mar 80, 77p ESCS-NRED-80-4

Responses of a sample of 106 operators and 69 landlords concerning degree of soil erosion, use of conservation practices, and factors hindering adoption of selected practices are described.

PB80-194848 PC **A04**/MF **A01**
Arkansas Water Resources Research Center, Fayetteville.
Simultaneous Transport of Water and 3HOH in Water.
H. D. Scott. Apr 80, 73p WRRC-SER-66, SR-78, W80-05472, OWRT-A-039-ARK(3)

The effect of parameters such as soil water flow velocity, equilibrium time, direction of flow, and initial soil water content on the magnitude of the transport coefficients of tritiated water (3HOH) was studied using a modification of the 'quick freeze' technique. For the study a Captina silt loam was air-dried, ground to 2mm or less and mixed thoroughly. Following soil moisture content adjustments and the addition of 3HOH, 50-g samples were hand-packed into cylindrical plexiglass half-cells. The cells were equilibrated, frozen, and sliced in 500 micron sections. Liquid scintillation techniques were used to analyze radioactivity.

PB80-812936 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Soil Structure Interactions. 1964-June, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Jun 80,
Guy E. Habercom, Jr. Jul 80, 191p
Supersedes NTIS/PS-79/0752 and NTIS/PS-78/0717.

Interactions resulting from loads exerted on soils and structures are reviewed. Such diversified structures as tunnels, conduits, pipes, piles, hardened installations, and plow blades are covered. Loads resulting from nuclear explosions as well as physical loads are investigated. Earthquake contributing loads are excluded. (This updated bibliography contains 181 citations, 42 of which are new entries to the previous edition.)

PB80-812969 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Soil Stabilization. 1975-June, 1980 (Citations from the NTIS Data Base).
Rept. for 1975-Jun 80,
Guy E. Habercom, Jr. Jul 80, 250p
Supersedes NTIS/PS-79/0785 and NTIS/PS-78/0724. See also 1964-1974, NTIS/PS-78/0723.

Soil stabilization methods and materials are reviewed in the citations. Pavement bases, beach sands, highway slopes, and foundation stabilization are investigated. (This updated bibliography contains 240 citations, 41 of which are new entries to the previous edition.)

RHO-SA-125 PC **A02**/MF **A01**
Rutgers--the State Univ., New Brunswick, NJ. Dept. of Plant Pathology.
Test of the Bresler-Russo-Miller Method for Unsaturated Conductivities.
T. L. Jones, W. A. Jordan, and G. W. Gee. 1979, 17p CONF-7908100-2
Contract EY-77-C-06-1030
American Society of Agronomy conference, Ft Collins, CO, USA, 5 Aug 1979.

Results of experiments designed to test the validity of the approach of Bresler et al., for soils found on the Hanford Site are presented. 7 figures, 3 tables. (ERA citation 05:023163)

9. ELECTRONICS AND ELECTRICAL ENGINEERING

9A. Components

AD-A085 012/3 PC **A08**/MF **A01**
BDM Corp Albuquerque NM
Total Dose Hardness Assurance. Volume I. Identification of Techniques.
Final rept. on Phase 1,
Ronald L. Pease, and Phil A. Young. Feb 80, 161p BDM/TAC-78-764-TR-R1-VOL-1, AFWL-TR-79-53-VOL-1
Contract F29601-78-C-0022
See also Volume 2, AD-A085 013.

This report covers the first phase of a three phase program to develop hardness assurance techniques for the total ionizing radiation dose environment for bipolar and MOS semiconductor devices. Phase I consists of identifying and verifying potentially useful techniques. The report is presented in two volumes. Volume one discusses all of the potential hardness assurance techniques that were identified and whether or not they are sufficiently verified in previous studies. In addition, new techniques are proposed based on models of radiation-induced hole trapping and interface state generation. Each technique identified or proposed is discussed in terms of its implementation, cost effectiveness, and acceptability. Recommendations are made for each technique to: (a) reject for this program, (b) verify its usefulness with further testing, or (c) accept as useful and include in the evaluation phase. The techniques investigated fall into five major categories: (1) preirradiation device electrical tests, (2) preirradiation tests on special test devices or wafers, (3) process or design controls, (4) radiation simulation tests, and (5) radiation tests. Over 20 techniques were identified and 9 were selected for further studies.

AD-A085 013/1 PC **A05**/MF **A01**
BDM Corp Albuquerque NM

Total Dose Hardness Assurance. Volume II. Verification Test Results.
Final rept. on Phase 1,
Ronald L. Pease, and Phil A. Young. Feb 80, 93p BDM/TAC-78-764-TR-R1-VOL-2, AFWL-TR-79-53-VOL-2
Contract F29601-78-C-0022
See also Volume 1, AD-A085 012.

This report covers the first phase of a three phase program to develop hardness assurance techniques for the total ionizing radiation dose environment for bipolar and MOS semiconductor devices. Phase I consists of identifying and verifying potentially useful techniques. The report is presented in two volumes. Volume one discusses all of the potential hardness assurance techniques that were identified and whether or not they are sufficiently verified in previous studies. In addition, new techniques are proposed based on models of radiation-induced hole trapping and interface state generation. Volume II is a summary of the test results of the verification tests performed on commercial semiconductor devices. These verification tests were performed either to supplement the limited available data for a potentially useful technique or to generate original data on previously unexamined techniques. The correlation coefficient was determined between the screening parameter and the total dose induced change in device electrical parameters on groups of 5-25 devices of a given type. No high degree of correlation was observed for any of the techniques investigated with the exception of irradiate and anneal on MOS devices.

AD-A085 432/3 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Fabrication and Microwave Performance of the Permeable Vase Transistor.
Journal article,
Carl O. Bozler, Ralph A. Murphy, William T. Lindley, Gary D. Alley, and Dale C. Flanders.
1979, 5p MS-5161, ESD-TR-79-351
Contract F19628-80-C-0002
Pub. in International Electron Devices Meeting, p384-387 Dec 79.

No abstract available.

AD-A085 506/4 PC **A05**/MF **A01**
Illinois Univ At Urbana-Champaign Coordinated Science Lab
Encapsulation Studies and Planar Device Fabrication in Gallium Arsenide.
Doctoral thesis,
Max John Helix. Sep 79, 96p Rept nos. R-858, UILU-ENG-78-2251
Contracts N00014-79-C-0424, N00014-76-C-0806

Low temperature photoluminescence and Auger electron spectroscopy (AES) are used to study SiO2 and Si3N4 as encapsulants for high temperature annealing of GaAs. These encapsulants are used in the fabrication of planar diodes in GaAs, and the resulting electrical and optical properties of the devices are examined. Silicon dioxide or silicon oxy-nitride layers allow the outdiffusion of Ga when they are used to encapsulate GaAs during high temperature annealing. .In contrast, silicon nitride layers which are essentially free of oxygen can be used to anneal GaAs with negligible Ga outdiffusion. A versatile rf plasma deposition system capable of depositing high quality Si3N4 films at low temperatures is described. In this system, reacting gases are introduced into the reaction chamber separately, and great care is taken to reduce residual oxygen in the system. Composition (ration of silicon to nitrogen), index of refraction, etch rate, and deposition rate are reported for films deposited under various conditions. Electrical characterization of the Si3N4 films is also presented.

AD-A085 548/6 PC **A02**/MF **A01**
Frank J Seiler Research Lab United States Air Force Academy CO
Alpha Particle-Induced Soft Errors in Microelectronic Devices. Part 1,
D. John Redman, Ronald M. Sega, and Richard Joseph. 1980, 7p
Pub. in Military Electronics/Countermeasures, p42-47 Mar 80.

No abstract available.

AD-A085 582/5 PC **A03**/MF **A01**
Frankel (Sidney) and Associates Menlo Park CA
Evaluation of Certain Transmission Line Forcing Functions.
Final rept.,
S. Frankel. Jun 79, 36p AFWL-TR-78-171, AD-E200 418
Contract F29601-78-C-0051

This study was undertaken to evaluate the relative importance of certain newly-discovered transmission-line forcing functions, the effect of which was expected to depend on the differences in line currents induced by incident electromagnetic waves. Straightforward calculation of these currents and their effects on typical lines showed that the apparent existence of these terms is due to an unconventional resolution of the currents into independent modes. Alternatively, it was found that the usual distributed series-voltage and shunt-current induced sources are generally necessary and sufficient to characterize external excitation of a line along its length. It was concluded that when the transmission-line component of the line currents is defined in the conventional manner, no new forcing terms are apparent.

AD-A085 642/7 PC **A03**/MF **A01**
Army Electronics Research and Development Command Fort Monmouth NJ Electronics Technology and Devices Lab
The Effect of Vibration on Quartz Crystal Resonators.
Technical rept.,
Raymond L. Filler. May 80, 38p Rept no. DELET-TR-80-10

The acceleration sensitivity of crystal oscillators is assuming increasing significance in modern communications, navigation and identification systems. This report describes how acceleration, particularly vibration, effects the frequency of quartz crystal controlled oscillators. Simple harmonic motion, complex and random vibrations, and frequency multiplication are covered. Several examples and experimental demonstrations are given. (Author)

AD-A085 643/5 PC **A05**/MF **A01**
Army Electronics Research and Development Command Fort Monmouth NJ Electronics Technology and Devices Lab
Acceleration Sensitivity Compensation of Crystal Resonators.
Technical rept.,
Arthur Ballato. Mar 80, 77p Rept no. DELET-TR-80-7

This report describes resonator configurations that are compensated for arbitrary directions of the acceleration field, and that require no additional electronics other than the oscillator circuitry normally used. This approach produces compensation with no changes in size, weight, and power, and applies to any crystal reference oscillator in any shock/vibration environment. (Author)

AD-A085 778/9 PC **A05**/MF **A01**
Aerospace Corp El Segundo CA Chemistry and Physics Lab
A Review of the Science and Technology of Cathodes from the Viewpoint of Spacecraft TWT Applications.
Interim rept.,
Gary W. Stupian. 1 Jun 80, 76p TR-0080(5970-03)-2, SD-TR-80-37
Contract F04701-79-C-0080

The current state of the art of cathode science and technology is summarized, with emphasis on the types of cathode now used, or with potential use, in U.S. Air Force communication satellites. The intent is that this report be a stand-alone discussion of cathode construction and of the basic physics of electron emission. Emphasis is placed on thermionic cathodes; however, one nonthermionic emitter, the field emitter, is discussed briefly. For the thermionic emitters, the barium (calcium and strontium) oxide cathode and dispenser cathodes (based on barium) are discussed, along with variant types of the oxide and dispenser cathodes. Thorium-based cathodes and lanthanum hexaboride cathodes are also described. Some of the available data on cathode failure modes and cathode lifetime are included. Electron emission from solids has been studied with varying intensity since the last century, and the present discussion, because of the scope of the subject, of course is incomplete. Extensive literature references are given. (Author)

AD-A085 793/8 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
A New Cut of Quartz for Temperature-Stable SAW Dispersive Delay Lines.
Journal article,
Daniel E. Oates. 31 May 79, 4p JA-4989, ESD-TR-80-8
Contract F19628-80-C-0002
Pub. in IEEE Transactions of Sonics and Ultrasonics, vSU-26 n6 p428-430 Nov 79.

No abstract available.

BNL-27456 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
X-Ray Examination of Lapped Electrical Insulation.
A. C. Muller. 1979, 6p CONF-791028-4
Contract EY-76-C-02-0016
Conference on electrical insulation and dielectric phenomena, Whitehaven, PA, USA, 21 Oct 1979.

The design and use of radiographic equipment for examining underground power transmission cable insulation for defects are described. The portable radiographic equipment can be used to examine cables in factories, in test facilities, or at underground installations. Radiographs of plastic-wound and paper-wound cables are included. (ERA citation 05:022493)

CONF-791102-148 MF **A01**
Oak Ridge National Lab., TN.
Advanced Designs for Highly Stable Superconductor Systems.
J. W. Lue, and J. R. Miller. 1979, 11p
Contract W-7405-ENG-26
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979. Microfiche copies only.

Experimental evidence is mounting for enhanced stability against pulsed heat loads in cable-in-conduit conductors brought about by transient pressure waves in helium. It has been suggested that this enhancement derives from improved heat transfer caused by pressure induced flow and from extra heat absorption capability due to the thermodynamic path followed by helium in the course of pressure rise and release. A basic conductor design is given to take advantage of these phenomena yet avoiding the difficulties encountered in the force-cooled conductor presently under development. The design is discussed in terms of manufacturability, performance, and applicability in large fusion magnets. A few small scale test conductors have been constructed. Preliminary test results on the performance of one of them is included. Possible variations offered by the flexibility of the basic design is also discussed. (ERA citation 05:023353)

CONF-791102-149 MF **A01**
Oak Ridge National Lab., TN.
Proposed Magnet System for EBT-P.
J. K. Ballou, T. J. McManany, W. H. Power, and H. T. Yeh. 1979, 16p
Contract W-7405-ENG-26
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979. Microfiche copies only.

Since EBT-P, and other EBT devices, depends on having closed field lines for its successful operation, a very tight tolerance (on the order of 6 parts in 10 exp 4) must be imposed on certain components of the field error. This is a global tolerance that influences the design of each magnet, its leads, the electrical bus, and the relative position of each magnet to its neighbors. This paper discusses the design, and field error analysis of the ORNL reference design for EBT-P. (ERA citation 05:023354)

CONF-800301-2 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
New Unitary and Multicomponent Gaseous Dielectrics.
D. R. James, L. G. Christophorou, and R. A. Mathis. 1980, 11p

Contract W-7405-ENG-26
International symposium on gaseous dielectrics, Knoxville, TN, USA, 9 Mar 1980.

Studies were continued on unitary gases and gas mixtures in order to determine the effects of basic physical properties - such as electron attachment, electron scattering, and electron-impact ionization - on the breakdown strength of gaseous dielectrics. The uniform field dc breakdown strengths (relative to SF sub 6 of 1) of some of the new unitary gases investigated are: 0.80, 1.32, 2.5, 2.5, 0.94, 0.41, 1.16, and 0.94 for C sub 2 F sub 6 , n-C sub 4 F sub 10 , 1,1,1-CC1 sub 3 CF sub 3 , 1,1,2-CC1 sub 2 FCC1F sub 2 , OCS, 1,1,1-CH sub 3 CF sub 3 , C sub 2 C1F sub 5 , and 1-C sub 3 F sub 6 , respectively. Mixtures of electron attaching and electron thermalizing gases have been studied with emphasis on optimizing the contribution of the electron thermalizer to the dielectric strength of a multicomponent gas mixture. Results are presented on mixtures containing electron attaching gases, such as SF sub 6 , 2-C sub 4 F sub 6 , and c-C sub 4 F sub 8 , and dipolar electron slowing-down components, such as CHF sub 3 , CH sub 2 F sub 2 , and 1,1,1-CH sub 3 CF sub 3 , which exhibited synergistic behavior. Similar behavior was exhibited by the binary mixtures SF sub 6 /1-C sub 3 F sub 6 , c-C sub 4 F sub 8 /1-C sub 3 F sub 6 , and SF sub 6 /OCS. These and earlier studies demonstrate the important role of electron scattering processes at subexcitation energies in effecting synergistic behavior in dielectric mixtures and in tailoring gaseous dielectrics for industrial application. (ERA citation 05:022373)

CONF-800301-3 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Dc Breakdown Strengths of Some Multicomponent Gas Mixtures in Concentric Cylinder Geometries.
C. C. Chan, M. O. Pace, and L. G. Christophorou. 1980, 10p
Contract W-7405-ENG-26
International symposium on gaseous dielectrics, Knoxville, TN, USA, 9 Mar 1980.

The results are reported of dc breakdown tests performed on mixtures of electron attaching gases from the group SF sub 6 , c-C sub 4 F sub 8 , and 2-C sub 4 F sub 8 , and electron moderating gases from the group N sub 2 , CHF sub 3 , 1,1,1-C sub 2 F sub 3 H sub 3 , in cylindrical-electrode geometries with different degrees of surface roughness, at total pressures of 0.1 and 0.44 MPa. Better electron moderating gases were sought. The binary mixture (c-C sub 4 F sub 8 and 1,1,1-C sub 2 F sub 3 H sub 3) and a number of multicomponent mixtures involving SF sub 6 , c-C sub 4 F sub 8 , 2-C sub 4 F sub 8 , CHF sub 3 , N sub 2 , and 1,1,1,-C sub 2 F sub 3 H sub 3 have shown improved properties (over SF sub 6) under the practical conditions of cylindrical geometry, rough surface, and high pressure. (ERA citation 05:022374)

EPRI-EL-1301 MF **A01**
Westinghouse Electric Corp., Sharon, PA.
High-Voltage Oil GAP Tests Using Parallel-Plane Electrodes.
T. K. Sloat, W. J. Carter, and H. R. Moore. Dec 79, 91p
Microfiche copies only.

A paraffinic-base insulating oil, PB, and a naphthenic-base insulating oil, NH, were evaluated using two electrode systems. The uniform field electrodes represented a method to easily test relatively large volumes of oil and showed the paraffinic-base oil, PB, had somewhat lower breakdown voltages on both 60-Hz tests and 1.2- X 50-microsecond impulse voltage tests. The rod to plane electrode system represented a more practical configuration that may occur in oil-insulated apparatus and showed there was no substantial difference between the oils on the 60-Hz tests. The impulse tests on the rod to plane test showed the paraffinic-base oil had a higher dielectric strength than the naphthenic-base oil. The routine daily dielectric breakdown voltage tests using ASTM D1816 showed the paraffinic-base oil has a higher dielectric strength than the naphthenic-base oil. Since the uniform field tests made with larger volumes of oil indicated a possible weakness in the paraffinic-base insulating oil, it is not acceptable for use in electrical apparatus. (ERA citation 05:022366)

KFK-2813 PC **A03**/MF **A01**
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Inst. fuer Technische Physik.
Investigation of Space and Time-Dependent Energy Input into the Cooling System of a Liquid Helium Forced Flow Cooled Superconducting Magnet.
Diploma thesis,
J. Benkowitsch. May 79, 42p
In German.
U.S. Sales Only.

This work investigates in experiments and calculations the consequences of a 'quench' in a forced-flow helium-cooled superconducting magnet in view of the helium flow. Transient pressure and temperature profiles caused by heat pulses are recorded. Based on a prooved program for calculation of instationary flows a program is developed, which allows to calculate the experimental results quantitatively. The results of the experiments and calculations are useful for the design of forced-flow cooling systems of large superconducting magnets. The numerical procedure allows in combination with programs, which are able to calculate the 'quench' in a current loaded conductor to investigate the influence of the process in helium flow on the stability of the magnet. (Atomindex citation 11:495479)

LBL-9960 PC **A03**/MF **A01**
Pacific Gas and Electric Co., San Francisco, CA.
Energy Efficiency and Performance of Solid State Ballasts.
J. E. Jewell, S. Selkowitz, and R. Verderber. Sep 79, 41p EEB-L-79-07, CONF-7908111-1
Contract W-7405-ENG-48
19. international commission on illumination session, Kyoto, Japan, 21 Aug 1979.

A project was undertaken to test the energy efficiency of ballasts. Two ballast types were used and retrofitted into existing fixtures on 3 floors in an office building in San Francisco. A core-coil energy efficient ballast was demonstrated also. The demonstration ballasts proved to be more efficient than the standard core-coil ballasts they replaced. Their energy demand reduction has resulted in a lower weekly peak demand. Operating above 20 KHz they have produced less audible noise. They also have lower heat dissipation. RFI radiation, although increased, has caused no apparent difficulties. Light output has been reduced slightly by all three demonstration ballasts. Ballast energy usage has been measured successfully with standard utility metering but there remain doubts as to the effects of the harmonics associated with solid-state circuitry. While no adverse effects have been observed, research must continue on the accuracy of electrical metering and on the effect on utility systems. The demonstration project has shown that solid-state fluorescent ballasts providing high frequency operation can be installed successfully in large numbers without adverse effects and with substantial energy saving. (ERA citation 05:019004)

PAT-APPL-6-135 058 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Langley Station, VA.
Electrically Conductive Palladium Containing Polyimide Films.
Patent Application,
L. T. Taylor, A. K. StClair, V. C. Carver, and T. A. Furtsch. Filed 28 Mar 80, 16p N80-24549/1, NASA-CASE-LAR-12705-1
Sponsored by NASA.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method is described for preparing lightweight, high temperature resistant, electrically conductive, palladium containing, polyimide films for use on aerodynamic and space applications. A palladium (2) ion-containing polymamic acid solution is prepared by reacting an aromatic dianhydride with an equimolar quantity of a palladium 2 ion-containing salt or complex. The reactant product is cast as a thin film onto a surface and cured at approximately 300 C to produce a flexible electrically conductive cyclic palladium containing polyimide. The source of palladium ions is selected from the gruop of palladium 2 compounds consisting of LiPdC14, PdS(CH3)22Cl2, Na2PdC14, and PdC14.

PAT-APPL-6-140 530 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Cable Protection from Rodents.
Patent Application,
Andrew D. Tweeddale. Filed 15 Apr 80, 8p AD-D007 290/0
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A protective sheath for use over a buried fibre optic cable wherein a plurality of spikes extend radially outward from an outer jacket which covers the fibre optic cable bundle surrounded by an inner jacket. The inner jacket, outer jacket and spikes are fabricated of a plastic composite material produced by polymerization which can be molded, extruded or cast into a suitable spiked shape. The cable is thereby protected from chewing or gnawing rodents that may be burrowing in the vicinity and would be discouraged from attacking the fibre optic cable.

PAT-APPL-6-141 076 PC **A02**/MF **A01**
Department of the Navy Washington DC
Temperature Stabilization Circuit for Charge Coupled Photodiode Array.
Patent Application,
Robert R. Atherton. Filed 17 Apr 80, 18p AD-D007 230/6
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A temperature compensating circuit for a Charge Coupled Photodiode array which monitors a composite video output signal from a video processor and generates an error signal proportional to the square wave resulting from an unbalanced condition. The error signal is used to generate bias voltages which are applied to the Charge Coupled Photodiode array and a degenerative feedback loop is formed which nulls the error signal and automatically balances the array odd and even video outputs. (Author)

PAT-APPL-6-142 794 PC **A02**/MF **A01**
Department of the Navy Washington DC
Localized Anodic Thinning.
Patent Application,
Don Wayne Shaw. Filed 22 Apr 80, 13p AD-D007 231/4
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A protective mask and a method of localized anodic thinning to prevent excessive thinning of an epitaxial layer in the forming of a field effect transistor. A moat exposing the epitaxial layer is provided in the protective mask surrounding a device pattern or group of patterns to be formed in the epitaxial layer by anodic thinning. During the thinning process, the area of the epitaxial layer exposed by the moat becomes fully depleted and cuts off current into the region surrounded by the moat and prevents excessive thinning of the epitaxial layer under the design pattern. (Author)

PATENT-4 194 021 Not available NTIS
Department of the Navy Washington DC
Microwave InP/SiO2 Insulated Gate Field Effect Transistor.
Patent,
Louis J. Messick. Filed 21 May 79, patented 18 Mar 80, 6p AD-D007 247/0, PAT-APPL-6-040 800
Supersedes PAT-APPL-6-040 800.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

an InP/SiO2 insulated gate field effect transistor which exhibits power gain at microwave frequencies is manufactured by using an n-type epitaxial semiconducting InP film on a semi-insulating InP substrate and depositing a pyrolytic silicon dioxide insulating film on the conducting InP film to form the gate insulator. (Author)

PATENT-4 194 171 Not available NTIS
Department of the Navy Washington DC
Zinc Oxide on Silicon Device for Parallel In, Serial Out, Discrete Fourier Transform.
Patent,

Edward C. Jelks. Filed 7 Jul 78, patented 18 Mar 80, 11p AD-D007 267/8, PAT-APPL-922 610
Supersedes PAT-APPL-922 610-78, AD-D005 667.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A material suitable for the propagation of acoustic waves on its surface comprises a substrate of semiconductor material, of which there exists an oxide, excluding the class of piezoelectric materials, the substrate having at least one flat surface. A layer of thermally grown oxide of the semiconductor material, is disposed on the flat surface. A film of titanium, approximately 300 angstroms thick, is disposed on at least a part of the layer of oxide. A layer of vacuum-deposited metal is disposed on the film of titanium. A layer of a piezoelectric vacuum-sputtered material is on the layer of vacuum-deposited metal and on the oxide. The semiconductor material may be silicon, the oxide may be silicon dioxide, the piezoelectric material may be zinc oxide, and the metal may be gold. The material further comprises an interdigitated electrode structure disposed upon the piezoelectric material, which, when an electrical signal is applied to it, can cause propagation of a surface acoustic wave (SAW) upon the surface of the piezoelectric material, the combination comprising a SAW transducer. (Author)

PATENT-4 203 642 Not available NTIS
Department of the Air Force Washington DC
Adjustable Connector.
Patent,
James V. Minard, Loeb J. Goldman, and Dale R. Foss. Filed 25 May 79, patented 20 May 80, 5p AD-D007 276/9, PAT-APPL-6-042 471
Supersedes PAT-APPL-6-042 471, AD-D006 214.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington DC 20231 $0.50.

An adjustable cardedge connector for use with two-sided printed circuit (pc) boards, which connector is capable of individual adjustments to align the contacts on each side of the pc board with corresponding connector contacts, and positive actuation to symmetrically clamp the connector onto the pc board with sufficient contact pressure to insure electrical continuity. On either side of a center board structure are pivotally attached clamping arms. At one end both clamping arms are actuated by a symmetrically disposed screw device referenced to the center board and attached to each clamping arm. The opposite ends of the clamping arms have segments which translate parallel to the pivot axis so that the connector contacts can be aligned with the pc board contacts. Attached to each translating segment is a block having multiple electrical contacts. When the connector and board are aligned and the screw device is actuated, the contacts on both blocks are compressively joined to the corresponding contacts on the two sides of the pc board. (Author)

PB80-812589 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Acoustic Surface Waves. April, 1976-June, 1980 (Citations from the NTIS Data Base).
Rept. for Apr 76-Jun 80,
William E. Reed. Jul 80, 155p
Supersedes NTIS/PS-79/0749 and NTIS/PS-78/0719. See also 1964-1972, NTIS/PS-75/248 and 1973-March, 1976, NTIS/PS-77/0583.

Surface wave devices, techniques, and applications are cited. Topics include signal processing, amplification, propagation, delay lines, transducers, and filters. (This updated bibliography contains 148 abstracts, 15 of which are new entries to the previous edition.)

PB80-812662 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Ferrite Microwave Electronics. June, 1976-June, 1980 (Citations from the NTIS Data Base).
Rept. for Jun 76-Jun 80,
William E. Reed. Jul 80, 190p
Supersedes NTIS/PS-79/0763 and NTIS/PS-78/0738. See also 1964-1969, NTIS/PS-75/457 and 1970-May, 1976, NTIS/PS-77/0592.

The bibliography cites research reports on single crystals, thin films, dielectrics, semiconductor devices, integrated circuits, phase shifters, and waveguide components. Studies on the microwave properties of ferrites are included. (This updated bibliography contains 182 citations, 13 of which are new entries to the previous edition.)

9B. Computers

AD-A085 308/5 PC **A02**/MF **A01**
Texas Univ At Austin Dept of Computer Sciences
Polarograms: A New Tool for Image Texture Analysis.
Interim rept.,
Larry S. Davis. Nov 79, 22p TR-116, AFOSR-TR-80-0416
Contract F49620-79-C-0043

This paper introduces a new tool for image texture analysis called a polarogram. A polarogram is a polar plot of an orientation sensitive texture statistic. Polarograms give rise to a class of texture descriptors which are sensitive to both texture coarseness and directionality, but yet which are invariant to rotations of the image textures. An experiment is described in which polarograms are applied to the classification of texture samples. (Author)

AD-A085 317/6 MF **A01**
Army Electronics Research and Development Command Fort Monmouth NJ Combat Surveillance and Target Acq Lab
Documentation of Software in the OL-192 PIBAL Program.
Technical rept.,
Raymond Bellucci. Apr 80, 74p Rept no. DELCS-TR-80-1
Availability: Microfiche copies only.

This report describes the software contained in the OL-192 PIBAL Program, and is intended to supply complete program description, file definitions, flow charts, and program listing. The program was written for the Hewlett Packard 9825A Calculator. The OL-192 PIBAL Program is used whenever the electronic capability of the Met station is inoperative either through equipment failure or limited frequency allocations. It quickly converts time and angular data into real time meteorological messages for the region of interest. Tables of unweighted temperatures and pressures for Central Europe, Scandinavia, Italy and Spain, Greece and E. Mediterranean, North Africa, South Africa, Western Russia, Siberian, Korea, SE Asia and the tropics, and Alaska and Polar regions are included in separate program tapes. The tables are entered using the true surface density as percent of standard. (Author)

AD-A085 323/4 PC **A05**/MF **A01**
General Electric Co Arlington VA Information Systems Programs
Evaluation of Software Life Cycle Data from the PAVE PAWS Project.
Final technical rept. 1 Sep 77-30 Nov 79,
Bill Curtis, Sylvia B. Sheppard, and Elizabeth Kruesi. Mar 80, 81p RADC-TR-80-28
Contract F30602-77-C-0194

Data were collected over the development cycle of the PAVE PAWS software development project. This project was designed to be a technology demonstration of modern programming practices. The practices studied on this project included: (1) Top-down design and implementation, (2) Structured coding and precompilers, (3) Program support library, (4) Program design language and HIPO charts, (5) Chief programmer teams, (6) Structured walkthroughs, (7) Independent test and quality assurance groups. The data available for evaluating this project included personhours, trouble reports, compiler summaries, code progression and durability charts from the library, management summaries, and personnel profiles. It was concluded from these data and our previous study on the LSDB project that modern programming practices are not miraculous productivity aids. Rather, these practices represent sound management principles which make software development more manageable and the prediction of project outcomes more accurate. Recommendations are also made for methods of collecting software life cycle data in future studies.

AD-A085 331/7 PC **A05**/MF **A01**
Honeywell Systems and Research Center Minneapolis MN
CCD Feasibility in High-Speed Data Sampling.
Final technical rept. 22 May-15 Dec 79,
C. L. Carrison, and R. C. Reitan. Jun 80, 90p 79SRC107, CORADCOM-79-0782F
Contract DAAK80-79-C-0782

The primary objective of this program was to prove the feasibility of using CCD delay lines for high-speed data sampling at 10 MHz, with 12-bit accuracy. Such a sampler would have broad applicability in ATE systems of the future. The vehicle for this study was a CCD high-speed sampler developed on Honeywell IR&D using the 2178 CCD developed at the Honeywell Solid State Electronics Center. The high-speed sampler was incorporated into a data acquisition system using a SYM-1 microcomputer. This system was used to measure device parameters including noise, leakage, transfer efficiency, and linearity. These measurements have shown not only that CCDs are a viable technology for high-speed sampling but that the technology is capable of higher speed performance and is ready to be applied to today's ATE problems. (Author)

AD-A085 340/8 PC **A02**/MF **A01**
University of Southern California Los Angeles Dept of Electrical Engineering
Testability Considerations in Microprocessor-Based Design.
Interim rept.,
John P. Hayes, and Edward J. McCluskey. 1980, 11p AFOSR-TR-80-0315
Contract F44620-76-C-0061, Grant AFOSR-77-3352
Pub. in IEEE Computer, v13 n3 p17-26 Mar 80. Sponsored in part by Grant NSF-MCS76-05327.

No abstract available.

AD-A085 404/2 PC **A02**/MF **A01**
General Research Corp Santa Barbara CA
An Automated Program Testing Methodology and Its Implementation.
Memorandum rept.,
J. P. Benson, and D. M. Andrews. 1980, 23p GRC-MEMO-2315, AFOSR-TR-80-0438
Contract F49620-79-C-0115

One of the themes emphasized at recent conferences is that new methods for testing and system development are going to be necessary to keep up with the trends of the future. Specifically cited as challenges for the 80's were the need to make software less labor intensive and the need for automated programming tools. The testing phase is one area where there are automated tools which subject software to static tests, but there exist few tools which automate the process of testing a program dynamically. Unlike hardware testing where a test pattern may be automatically stepped through and the test results evaluated by comparison with a 'gold unit', software has had no similar testing capability. This method goes one step farther even than the traditional hardware testing methods, because it also has the capability to automatically generate new testcases by perturbing the input values in accordance with an automated 'intelligent' evaluation of the past performance of a sequence of inputs.

AD-A085 414/1 PC **A02**/MF **A01**
Walter Reed Army Inst of Research Washington DC
MASTER/SLAVE: Interprocessor Communications between PDP8s,
Bruce E. Hamilton, and Timothy F. Elsmore. 1980, 4p
Pub. in Behavior Research Methods and Instrumentation, v12 n2 p241-243, 1980.

No abstract available.

AD-A085 430/7 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Digital Restoration of AC-Coupled Infrared Images.
Journal article,
Richard J. Becherer, and Barbara A. Capron. 1979, 10p MS-5098, ESD-TR-79-346
Contract F19628-80-C-0002

Pub. in SPIE, p161-169 1979.

No abstract available.

AD-A085 498/4 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
New Technique for Blind Deconvolution.
Journal article,
Stephen C. Pohlig, Alan v. Oppenheim, Anthony E. Filip, Jae S. Lim, and Dan E. Dudgeon. 1979, 7p MS-5036, ESD-TR-79-342
Contract F19628-80-C-0002
Pub. in SPIE, v207 p119-124 1979.

No abstract available.

AD-A085 515/5 PC **A02**/MF **A01**
Virginia Polytechnic Inst and State Univ Washington DC Dept of Computer Science
A SIMULA Program for SLR(1) Parsing.
Technical Memo.,
Johannes J. Martin. Jan 80, 10p VPI/SU-TM-80-1, AFOSR-TR-80-0445
Grant AFOSR-79-0021

The report describes a SIMULA program that parses character strings according to a grammar preprocessed by a parser generator. The program does not furnish error recovery. This report provides all information necessary to use the program including a detailed description of the format of the parse tree produced and the symbol table employed. (Author)

AD-A085 516/3 PC **A03**/MF **A01**
Virginia Polytechnic Inst and State Univ Washington DC Dept of Computer Science
DIALOG-A SIMULA Class for Writing Interactive Programs.
Technical memo.,
Richard J. Orgass, and Robert E. Porter. 14 Oct 79, 28p VPI/SU-TM-79-3A, AFOSR-TR-80-0446
Grant AFOSR-70-0021

A SIMULA class containing procedures for easily writing programs that interact with a user by asking questions at run time and which dynamically name and open files at run time is described. The class uses properties of IBM SIMULA that are not available in other implementations. It also depends on the EBCDIC character codes rather than ASCII but it is assumed that a user's terminal is an ASCII terminal. This revised report describes a number of extensions of DIALOG. While most programs using the old version will work correctly with the new version, there are many enhancements and users are advised to reread all Sections 3 to 9. (Author)

AD-A085 517/1 PC **A02**/MF **A01**
Virginia Polytechnic Inst and State Univ Washington DC Dept of Computer Science
Converting DEC-10 SIMULA Programs to CMS SIMULA.
Technical memo.,
Richard J. Orgass. 30 Jul 79, 11p VPI/SU-TM-79-7, AFOSR-TR-80-0447
Grant AFOSR-79-0021
See also Rept. no. VPI-TM-79-3, AD-A083 267.

This note reports on the writer's experience moving DEC-10 SIMULA programs to CMS and executing the programs with CMS SIMULA. The languages implemented by the two compilers is the same and this makes the transfer of SIMULA programs very easy. In contrast, it is very difficult to transfer Fortran programs from a DEC-10 to CMS. The two main sources of difficulty in transferring programs are the differences in the character set and file system of the two systems and the fact that CMS lacks many of the capabilities that TOPS-10 users take for granted. The directions for moving DEC-10 SIMULA programs to IBM SIMULA that are provided with release 3 refer to older versions of IBM SIMULA and it is now possible to preserve most of the separately compiled classes and procedures while moving programs to CMS SIMULA.

AD-A085 637/7 PC **A03**/MF **A01**
Army Satellite Communications Agency Fort Monmouth NJ
Project Aries. Z80 Cross Assembler and Linker User's Manual.
Final rept. May 79-May 80,
Richard L. Conn. Apr 80, 49p

The Z80 Cross Assembler described by this document is a Zilog-standard cross assembler written in PASCAL. It supports all the Zilog-standard mnemonics, but its pseudo-ops are unique to this assembler (to some extent). This assembler produces relocatable code which may be later linked and loaded by its companion linking loader. This cross assembler was customized for application with the ARIAN II operating system. It is designed to be run on a CDC 6000 or CYBER class machine. The intended operating environment is in a time-sharing mode on the host computer with a microcomputer linked to the host for communications and, specifically, downloading. (Author)

AD-A085 664/1 PC **A03**/MF **A01**
Virginia Polytechnic Inst and State Univ Washington DC Dept of Computer Science
CMS RATFOR User's Manual.
Technical memo.,
Stephen M. Choquette, and Richard J. Orgass. 1 Jul 79, 26p VPI/SU-TM-79-5, AFOSR-TR-80-0444
Grant AFOSR-79-0021

RATFOR is a preprocessor for Fortran that provides modern control structures and a substantial improvement in the syntax of Fortran programs. The output of RATFOR is a Fortran program that is compiled by the Fortran processors and then executed. The RATFOR preprocessor provides statement grouping, IF-ELSE structures and four loops: DO, FOR, WHILE and REPEAT-UNTIL. RATFOR source text is free format with multiple statements on a line. Upper and lower case letters are treated as upper case letters except in character constants. There is an include facility so that large programs can be constructed out of a multitude of small files without using the system editor. RATFOR accepts files consisting of fixed length 80 column records with imbedded tabs. This manual is a complete set of instructions for using the preprocessor. It includes a description of the RATFOR syntax, a detailed explanation of the preprocessor error messages and directions for using the processor.

AD-A085 665/8 PC **A03**/MF **A01**
Virginia Polytechnic Inst and State Univ Washington DC Dept of Computer Science
CMS Software Notebook. First Edition.
Technical memo.,
Richard J. Orgass. Jul 79, 37p VPI/SU-TM-79-6, AFOSR-TR-80-0448
Grant AFOSR-79-0021

A brief description of the software that is available in the Computer Science Library on CMS. Additional contributions are solicited and directions for contributing software are given. (Author)

AD-A085 710/2 PC **A06**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Engineering
Learning Game Evaluation Functions with a Compound Linear Machine.
Master's thesis,
William Peter Nelson. Mar 80, 123p Rept no. AFIT/GCS/EE/80-2

This paper proposes a structure for a compound linear machine as a solution to the problem of learning in machine game playing. A possible algorithm for training the two machines is involved. An attempt to use a compound machine for choosing chess moves is reported on. Chapter II briefly presents the background concepts in pattern recognition and machine game playing that underlie the work done. Chapter III presents a proposed structure for a compound linear machine that should be capable of learning in game playing. The general rationale for the proposal is presented also. Chapter IV discusses a possible algorithm for training the compound machine proposed. The rationale for each step of the algorithm is discussed. The game of tic-tac-toe is used as an example in explaining each step. Chapter V compares and contrasts the linear machine approach with other approaches to game playing. Chapter VI presents an attempt to apply the proposal and associated training algorithm to the game of chess. Conclusions and recommendations are given in Chapter VII. Appendices contain supportive material and data on work performed. (Author)

AD-A085 742/5 MF **A01**
Honeywell Inc St Petersburg FL
Military Adaptation of Commercial Item (MACI) Program of Electrically Alterable Read Only Memory (EAROM).
Interim rept. no. 2, 15 Jan-15 Dec 79,
Richard L. Wiker, R. W. Carter, and J. Maddox. Apr 80, 120p 1079-16060-2, DELET-TR-78-2935-2
Contract DAAB07-78-C-2935
See also Rept. no. DELET-TR-78-2935-1, AD-A078 594.
Availability: Microfiche copies only.

Comparison of MNOS Device performance, device type selection, development of screening tests, and test plan. (Author)

AD-A085 754/0 PC **A03**/MF **A01**
Rockwell International Anaheim CA Electronics Research Center
High Density Magnetic Bubble Memory Techniques.
Interim rept. 1 May 78-1 Apr 79,
D. M. Heinz, and V. Speriosu. Mar 80, 31p C76-845.47/501, AFWAL-TR-80-1027
Contract F33615-76-C-1198

Ion implantation of device structures into magnetic garnet films is a developing technique for producing bubble memory devices. In order to specify the implantation species, energy and dose, it is necessary to know the effect that these implantation conditions have on the garnet's crystalline and magnetic properties. A kinematical model of X-ray diffraction was developed for a thin layer whose strain and damage distributions are functions of depth. The actual strain and damage distributions in ion-implanted layers may be obtained by fitting experimental X-ray diffraction rocking curves. Synthesis of the distributions is greatly facilitated by taking a rocking curve after each of a series of progressively deeper etching steps. A detailed description of the kinematical model is followed by its application to implanted garnet, and results are presented for single and multiple ion implantations. (Author)

AD-A085 780/5 MF **A01**
Massachusetts Univ Amherst Dept of Computer and Information Science
Experiments in Schema-Driven Interpretation of a Natural Scene.
Technical rept.,
Cesare C. Parma, Allen R. Hanson, and Edward M. Riseman. Apr 80, 110p Rept no. COINS-TR-80-10
Contract N00014-75-C-0459, Grant NSF-MCS79-18209
Availability: Microfiche copies only.

The system under development, VISIONS, is an investigation into general issues in the construction of computer vision systems. The goal is to provide an analysis of color images of outdoor scenes, from segmentation (or partitioning) of an image through the final stages of symbolic interpretation of that image. The output of the system is intended to be a symbolic representation of three-dimensional world depicted in the two-dimensional image, including the naming of objects, their placement in three-dimensional space, and the ability to predict from this representation the rough appearance of the scene from other points of view. Research in segmentation and interpretation has been separated into the development of two major subsystems with quite different methodologies and considerations. The focus of this paper is upon the interpretation system. The primary emphasis will be on the development of strategies by which several knowledge sources (KSs) can be integrated using expected knowledge stored in structure called 3D and 2D schemas, each of which may be general or specific to the scene under consideration. A series of increasingly more difficult experiments is outlined as an experimental methodology for developing schema-driven (e.g., top-down) control mechanisms; each succeeding experiment will assume a set of weaker constraints, representing image interpretation tasks where a decreasing amount of knowledge of the situation is available. Experimental results show current capabilities of a number of KSs and the effectiveness of a specific 2D schema in the interpretation of a scene. (Author)

DOE/ER/02487-6 PC **A04**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Lab. for Nuclear Science.
LNS Users Primer for Accessing Government Sites on the ARPA Network.
M. Kannel. 1 Jun 79, 63p
Contract AS02-76ER02487

This primer was developed as part of the study conducted by the Laboratory for Nuclear Science (LNS) on the feasibility of networks for computer resource sharing. The primer is an instructinal guide for the LNS user who would like to access and use computers at other government sites on the ARPA network. The format is a series of scenarios of actual recorded on-line terminal sessions' showing the novice user how to access the foreign site, obtain help documentation, run a simple program, and transfer files to and from the foreign site. Access to the ARPA network in these scenarios is via Multics or the Massachusetts Institute of Technology Terminal Interface Processor. The foreign government sites accessed are the computing facilities at Argonne National Laboratory, Brookhaven National Laboratory, Lawrence Livermore Laboratory, and New York University Courant Institute. This technique of auditing actual terminal sessions as a teaching aid can be extended to include other computing facilities as well as other networks. (ERA citation 05:023384)

DOE/ER/02487-7 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Lab. for Nuclear Science.
Feasibility Study of Networks. Final Erport.
E. J. Campbell, and M. S. Kannel. 15 Dec 79, 20p
Contract AC02-76ER02487

From July, 1974, to December, 1979, the Laboratory for Nuclear Service (LNS) conducted a study of the feasibility of resource sharing via general - purpose computer networks. Originally, the study focused on methods of implementing an ARPAnet connection for LNS in collaboration with the MIT Information Processing Center (IPC). When it appeared that the most feasible solution for LNS was to access the ARPANET via the MIT Multics system, the investigation expanded to a consideration of the implementation of computer resource sharing via networks. Experiments were performed at various ERDA installations on the ARPANET in using the networks for offloading large calcuations and obtaining access to unique hardware and software. Performance statistics were collected and cost comparisons, made. Both the benefits and barriers of networking were analyzed. The value of electronic mail, teleconferencing, and other forms of computer-aided communication was also investigated. The study demonstrated that resource sharing via networks can provide small computer installations access to computer facilities not available on site. However, it is not adequate substitute for an on-site computer. There must be enough computing power locally to service the average load. Certain types of computations are not effectively done on the network. Use of the network is most feasible for access to powerful processors and large memories or to unique hardware such as a vector processor. Certain barriers, both technical and nontechnical, must be overcome before computer resource sharing via networks will become widespread. Expanded use of current message and teleconferencing systems should be encouraged within the DOE community. (ERA citation 05:023385)

NUREG/CR-1169-V-3 PC **A05**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Safeguard Vulnerability Analysis Program (SVAP) User's Manual,
W. J. Orvis. May 80, 98p UCRL-52730
See also Volume 2, NUREG/CR-1169-V-2.

The operation and use of the Safeguards Vulnerability Analysis Program (SVAP) Input/Output programming written for a Tektronix 4050 series computer is described. The programming consists of the Facility Description Program and its continuation, the Accounting System Program, plus several service routines. These programs generate the input files that will be used by the SVAP codes in a main frame computer, such as the CDC 7600 at Lawrence Livermore Laboratory. SVAP addresses one class of safeguards threat: theft or diversion of special nuclear material (SNM) by nonviolent insiders, acting individually or in collusion. This user's manual will assist the NRC analyst in implementing SVAP applications; it is the principal guide to computer use in SVAP.

N80-25760/3 PC **A07**/MF **A01**
North Carolina State Univ. at Raleigh. Dept. of Electrical Engineering.
Pattern Classification Using Charge Transfer Devices.
Final Report.
16 Jun 80, 138p NASA-CR-163237
Grant NSG-1535

The feasibility of using charge transfer devices in the classification of multispectral imagery was investigated by evaluating particular devices to determine their suitability in matrix multiplication subsystem of a pattern classifier and by designing a protype of such a system. Particular attention was given to analog-analog correlator devices which consist of two tapped delay lines, chip multipliers, and a summed output. The design for the classifier and a printed circuit layout for the analog boards were completed and the boards were fabricated. A test j:g for the board was built and checkout was begun.

N80-26045/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
Low Power NASA 36 Bit Time Code Generator.
D. Langjahr. Apr 80, 16p NASA-TM-80697

A 36 bit time code generator implemented in CMOS is described. A microprocessor is used to minimize chip count. A modified 20 second format is available as an option, by changing two program steps.

N80-26053/2 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
The RSZ BASIC Programming Language Manual.
R. J. Stattel, J. K. Niswander, and A. K. Kochhar. Jun 80, 52p NASA-TM-80690

The RSZ BASIC interactive language is described. The RSZ BASIC interpreter is resident in the Telemetry Data Processor, a system dedicated to the processing and displaying of PCM telemetry data. A series of working examples teaches the fundamentals of RSZ BASIC and shows how to construct, edit, and manage storage of programs.

N80-26054/0 PC **A04**/MF **A01**
Wolf Research and Development Corp., Pocomoke City, MD.
ARC Program Documentation.
J. D. Mcmillan. Mar 76, 52p NASA-CR-156867
Contract NAS6-2639

A description of the input and output files and the data control cards for the altimeter residual computation (ARC) computer program is given. The program acts as the final altimeter preprocessor before the data is reformatted for external users. It calculates all parameters necessary for the computation of the altimeter observation residuals and the sea surface height. Mathematical models used for calculating tropospheric refraction, geoid height, tide height, ephemeris, and orbit geometry are described.

N80-26055/7 PC **A03**/MF **A01**
Old Dominion Univ. Research Foundation, Norfolk, VA.
An Investigation of the Feasibility of Improving Oculometer Data Analysis Through Application of Advanced Statistical Techniques.
Final Report, 1 Nov. 1978 - 31 Dec. 1979.
D. S. Rana. Jun 80, 36p NASA-CR-163238
Grant NSG-1565

The data reduction capabilities of the current data reduction programs were assessed and a search for a more comprehensive system with higher data analytic capabilities was made. Results of the investigation are presented.

N80-26057/3 PC **A03**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
An Application of Software Design and Documentation Language.
E. D. Callender, T. B. Clarkson, and C. E. Frasier. Jun 80, 41p NASA-CR-163258, JPL-PUB-80-16
Contract NAS7-100

The software design and documentation language (SDDL) is a general purpose processor to support a lanugage for the description of any system, structure, concept, or procedure that may be presented from the viewpoint of a collection of hierarchical entities linked together by means of binary connections. The language comprises a set of rules of syntax, primitive construct classes (module, block, and module invocation), and language control directives. The result is a language with a fixed grammar, variable alphabet and punctuation, and an extendable vocabulary. The application of SDDL to the detailed software design of the Command Data Subsystem for the Galileo Spacecraft is discussed. A set of constructs was developed and applied. These constructs are evaluated and examples of their application are considered.

N80-26058/1 PC **A04**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
NDTRAN: Interpreter of Dynamic Systems O Interpretador de Sistemas Dinamicos: NDTRAN.
H. G. V. S. Borges. Mar 80, 64p
Text in Portugese; English Summary.

Computer methods for system dynamic simulation are examined with specific emphasis on the dynamic modeling translator (DYNAMO) and the Notre Dame Translator (NDTRAN). Both are specific for simulation of continuous time. The characteristics of the NDTRAN and the DYNAMO, together with the NDTRAN language syntax, are presented. Two examples illustrate the use of the NDTRAN.

N80-26059/9 PC **A05**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Algorithms for Sample Classification and Image Feature Selection Algoritmos Para Classificacao de Amostras E Selecao de Atributos de Imagens.
C. R. Desouza, L. R. Decamargos, R. Kumar, and N. D. A. Mascarenhas. Apr 80, 88p INPE-1718-RPE/124
Text in Portugese; English Summary.

Two algorithms are described for sample classification in Earth resources multispectral imagery. The first one uses the JM-distance, while the second one is based on the maximum likelihood criterium. A feature selection algorithm was also implemented under the following criteria: average JM-distance and minimum JM-distance.

N80-26060/7 PC **A04**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Partitioning Multispectral Imagery of the Earth Resources Particionamento de Imagens Multiespectrais de Recursos Naturais DA Terra.
W. K. Takahashi, A. W. Decfilho, and R. Kumar. Feb 80, 65p INPE-1678-RPE/111
Text in Portugese; English Summary.

An efficient algorithm is described for partitioning multispectral Earth resources imagery. Statistically homogeneous objects are extracted, for posterior classification.

N80-26061/5 PC **A06**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
A Language for Simulating Dynamic Hierarchical Systems Uma Linguagem Para Simulacao de Sistemas Dinamicos Hierarquizados.
M.S. Thesis.
H. G. V. S. Borges. Apr 80, 111p INPE-1728-TDL/024
Text in Portuguese; English Summary.

A software package for the simulation of hierarchical systems, written for the B6700 computer is described. The main purpose of the package is to simplify the modeling and subsequent simulation of large systems, by considering each of its parts as a subsystem. Flux and level diagrams are used

as modeling tools. The HIERTRAN package was programmed utilizing the NDTRAN simulation language. A user's manual as well as implementation details are included.

N80-26063/1 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
LANAC: A High Level Language for Data Acquisition and Process Control by Minicomputers Lanac - Uma Linguagem de Alto Nivel Para Acquisicao de Dados E Controle de Processos Por Minicomputador.
F. E. C. Viola, and C. D. R. E. Souza. Apr 80, 16p INPE-1721-RPE/126
Text in Portugese. Presented at the 70TH Seminar Integrado de Software DA Soc. Brasileira de Computacao.

The 'Revised Report on the Algorithmic Language (ALGOL-6)' is the basis for a language proposed for programming minicomputers that handle data acquisition and the control of parallel processes in real time. The special implementation proposed is for the generation of symbolic codes of the assembly type for the Hewlett-Packard 2116B, and consists of a compiler written in ALGOL B-6700.

N80-26065/6 PC **A03**/MF **A01**
Lockheed Engineering and Management Services Co., Inc., Houston, TX.
As-Built Design Specification of the Data Order Processor ORDHDT.
A. Rios. Mar 80, 41p NASA-CR-160694, LEMSCO-14596
Contract NAS9-15800

A description and subroutine documentation of the data order processor, ORDHDT is given. As part of the LANDSAT imagery verification and extraction system, ORDHDT creates a computer tape containing the AgRISTARS requirements for LANDSAT data to be ordered from Goddard Space Flight Center. A brief description of hardware requirements is also included.

N80-26082/1 PC **A04**/MF **A01**
MITRE Corp., Houston, TX.
Some Queuing Network Models of Computer Systems.
E. S. Herndon. Mar 80, 56p NASA-CR-160693, M80-7
NASA ORDER T-8231-G, Contract F19628-80-C-0001

Queuing network models of a computer system operating with a single workload type are presented. Program algorithms are adapted for use on the Texas Instruments SR-52 programmable calculator. By slightly altering the algorithm to process the G and H matrices row by row instead of column by column, six devices and an unlimited job/terminal population could be handled on the SR-52. Techniques are also introduced for handling a simple load dependent server and for studying interactive systems with fixed multiprogramming limits.

N80-26083/9 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
The Use of Negative Feedback and Convolution Integral in the Control of Nonlinear Instability O USO de Realimentacao Negativa E Integral de Convolucao No Controle DA Instabilidade Nao-Linear.
C. L. P. Neto, and A. E. C. Pereira. May 80, 6p INPE-1733-RPE/133-REV
Text in Portugese; English Summary. Revised. Proposed for Presentation at 30TH Congr. Brasileiro de Automatica, Rio de Janeiro, 16-19 Sep. 1980.

Some methods used in the nonlinear instability control are analyzed. It is shown that these methods cause losses in the linear terms. A method that uses negative feedback is developed aiming to correct the instability produced by the positive feedback and employing convolution integral instead of Fourier transform followed by inverse Fourier transform, damping, or artificial viscosity. This method minimizes the losses in the linear terms.

N80-26084/7 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Optimal Linear Estimation Applied to Generate Suboptimal Numerical Solutions for Control Problems.
A. R. Neto. May 80, 6p INPE-1731-RPE/131
Text in Portuguese; English Summary. Proposed for Presentation at the 30TH Congr. Brasileiro de Automatica, Rio de Janeiro, 16-19 Sep. 1980.

A procedure for the generation of suboptimal numerical solutions in dynamical systems optimal control problems is described. The approximation of the control by a functional dependent upon a finite number of parameters and the adoption of a linear perturbation scheme, with a direct search criterion, reduces the problem, in each iteration, to a parameter optimization. An estochastic interpretation of the search criterion and of the errors due to the linear approximation makes it possible to get the increment in each step by using optimal linear estimation.

PATENT-4 192 012 Not available NTIS
Department of the Navy Washington DC
Crosstie Memory Bit Stretcher Detector.
Patent,
Leonard J. Schwee, Wallace E. Anderson, Yuan-Jye Liu, and Ronald N. Lee. Filed 8 Nov 78, patented 4 Mar 80, 17p AD-D007 250/4, PAT-APPL-958 913
Supersedes PAT-APPL-958 913-78, AD-D006 659.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A magnetoresistance detector linearly stretching single bits of binary information such as those represented by Bloch line - crosstie pairs, along the major dimension of a thin magnetic film strip such as a serriform crosstie memory. the detector circuit is overlaid upon the thin magnetic film strip. In a selected area, less pronounced serrations in the adjacent margins, in conjunction with a magnetic field created by current through the detector circuit enable Bloch lines entering the area to travel farther. A series of oriented open segments in the overlain section of the detector circuit, arranged in symmetric correspondence with serrations in the adjacent margins, enhances the difference between logical zero and one signals in the detector circuit. (Author)

PATENT-4 202 042 Not available NTIS
Department of the Navy Washington DC
Digital to Analog Interface for Simultaneous Analog Outputs.
Patent,
John P. Connors, Bernard J. Nordmann, David M. Wainland, and Henry P. Bell. Filed 5 Jul 77, patented 6 May 80, 7p AD-D007 260/3, PAT-APPL-813 038
Supersedes PAT-APPL-813 038-77, AD-D006 700.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

Interface circuitry for obtaining simultaneous, multi-channel analog outputs from a microprocessor, avoiding sequential addressing delays. The technique involves inserting, for each analog output channel, a buffer latch between the data bus lines from the microprocessor and the D/A latch associated with the D/A converter. The buffer latches are sequentially addressed by control logic circuitry and loaded from the computer memory in accordance with software instructions in the microprocessor. While data is being loaded in the buffer latches, the D/A latches are disabled, preventing the data from being presented to the D/A converters. When all channels are loaded, the D/A latches are strobed simultaneously, enabling them and transferring the data stored in the buffer latches to the D/A converters for conversion to analog outputs. (Author)

PB80-190267 PC **E02**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
Tandem Computers, Inc. COBOL-T9201D00, Indexed I-O, Module Level 1.
Validation summary rept.
13 Jun 80, 10p FCTC/TR-80/04, CCVS74-VSR600

This FCTC Technical Report for the Indexed I-O Module of the TANDEM/16 T9201 COBOL Compiler Version D00 (GUARDIAN Version T9000D03) provides a consolidated summary of the results obtained from the evaluation of the subject compiler against the Indexed I-O Module of the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). This Technical Report is made up of several sections showing the discrepancies found. A companion report (Validation Summary Report CCVS74-VSR600) provides information regarding the validation of the Compiler at the low-intermediate level of Federal Standard COBOL (FIPS PUB 21-1).

PB80-190275 PC **E02**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
TANDEM/16, FORTRAN - T9202D01.
Validation summary rept.
13 Jun 80, 14p FCVS78-VSR605

This Validation Summary Report (VSR) for the TANDEM/16 T9202 Fortran Compiler Version D01 (GUARDIAN Version T9000D03) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1978 Fortran Standard (X3.9-1978). The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies; a section relating the categories of discrepancies to the language; and a detailed listing of discrepancies together with the tests which were failed.

PB80-190283 PC **E03**/MF **A01**
Federal Compiler Testing Center, Washington, DC.
TANDEM/16, COBOL -T9201D00.
Validation summary rept.
13 Jun 80, 53p CCVS74-VSR600

This Validation Summary Report (VSR) for the TANDEM/16 T9201 COBOL Compiler Version D00 (GUARDIAN Version T9000D03) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 COBOL Standard (X3.23-1974/FIPS PUB 21-1). The compiler was validated at the low-intermediate level of FIPS PUB 21-1. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974, a section relating the categories of discrepancies to each of the Federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed.

PB80-812597 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Microcomputers: General Applications. 1978-May, 1979 (Citations from the NTIS Data Base).
Rept. for 1978-May 79,
Brian Carrigan. Jun 80, 188p
Updates NTIS/PS-77/0325. Supersedes NTIS/PS-79/0725 and NTIS/PS-78/0609.

This bibliography of Federally-funded research cites studies on the applications of minicomputers. These include process control, testing, navigation, instrumentation, biomedicine, machining, training, as well as other applications. (This updated bibliography contains 181 abstracts, none of which are new entries to the previous edition.)

PB80-812605 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Microcomputers: General Applications. June, 1979-May, 1980 (Citations from the NTIS Data Base).
Rept. for Jun 79-May 80,
Brian Carrigan. Jun 80, 165p
Updates NTIS/PS-77/0325. Supersedes NTIS/PS-79/0725 and NTIS/PS-78/0609.

This bibliography of Federally-funded research cites studies on the applications of minicomputers. These include process control, testing, navigation, instrumentation, biomedicine, machining, training, as well as other applications. (This updated bibliography contains 158 abstracts, all of which are new entries to the previous edition.)

PB80-812613 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.

Microcomputers: Design and Software Development. 1964-1978 (Citations from the NTIS Data Base).
Rept. for 1964-78,
Brian Carrigan. Jul 80, 220p
Updates NTIS/PS-77/0325. Supersedes NTIS/PS-79/0723 and NTIS/PS-78/0610.

The design of microcomputers and the development of its software are covered in this bibliography of Federally-funded research. Studies on microcomputer applications are included only if the above topics are cited. Circuit and chip technology, reliability, and performance evaluation are included. (This updated bibliography contains 213 abstracts, none of which are new entries to the previous edition.)

PB80-812621 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Microcomputers: Design and Software Development. 1979-May, 1980 (Citations from the NTIS Data Base).
Rept. for 1979-May 80,
Brian Carrigan. Jul 80, 90p
Supersedes NTIS/PS-79/0723 and NTIS/PS-78/0610.

The design of microcomputers and the development of its software are covered in this bibliography of Federally-funded research. Studies on microcomputer applications are included only if the above topics are cited. Circuit and chip technology, reliability, and performance evaluation are included. (This updated bibliography contains 83 abstracts, 62 of which are new entries to the previous edition.)

PB80-812639 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Microcomputers: General Applications. 1978-May, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1978-May 80,
Brian Carrigan. Jul 80, 146p
Supersedes NTIS/PS-79/0727 and NTIS/PS-78/0612. See also NTIS/PS-76/0203, NTIS/PS-77/0326, NTIS/PS-78/0611, and NTIS/PS-79/0726.

The bibliography of worldwide research literature cites studies on the applications of microcomputers. These include automotive, testing, navigation, instrumentation, biomedical, machine tools, and other applications. (This updated bibliography contains 139 abstracts, 42 of which are new entries to the previous edition.)

PB80-812647 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Microcomputers: Basic Design and Development. June, 1978-June, 1979 (Citations from the Engineering Index Data Base).
Rept. for Jun 78-Jun 79,
Brian Carrigan. Jul 80, 218p
Supersedes NTIS/PS-79/0730 and NTIS/PS-78/0615. See also NTIS/PS-76/0203, NTIS/PS-77/0326, NTIS/PS-78/0614, and NTIS/PS-79/0729.

The bibliography of worldwide research literature cites studies on the design and development of microcomputers. Studies on software development, chip development, LSI technology, and reliability and performance evaluation testing are included. (This updated bibliography contains 211 abstracts, none of which are new entries to the previous edition.)

PB80-812654 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Microcomputers: Basic Design and Development. July, 1979-May, 1980 (Citations from the Engineering Index Data Base).
Rept. for Jul 79-May 80,
Brian Carrigan. Jul 80, 190p
Supersedes NTIS/PS-79/0730 and NTIS/PS-78/0615. See also NTIS/PS-76/0203, NTIS/PS-77/0326, NTIS/PS-78/0614, and NTIS/PS-79/0729.

The bibliography of worldwide research literature cites studies on the design and development of microcomputers. Studies on software development, chip development, LSI technology, and reliability and performance evaluation testing are included. (This updated bibliography contains 183 abstracts, all of which are new entries to the previous edition.)

PB80-812688 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Microcomputers: Telecommunication Applications. March, 1976-June, 1979 (Citations from the Engineering Index Data Base).
Rept. for Mar 76-Jun 79,
William E. Reed. Jul 80, 266p
Supersedes NTIS/PS-79/0728 and NTIS/PS-78/0613. See also NTIS/PS-76/0203, and NTIS/PS-77/0326.

The bibliography of worldwide research literature cites studies on telecommunication applications of microcomputers. Telephone, data transmission, teleprinters, facsimile communication, and communications controllers are among the applications cited. (This updated bibliography contains 260 abstracts, none of which are new entries to the previous edition.)

PB80-812696 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Microcomputers: Telecommunication Applications. July, 1979-June, 1980 (Citations from the Engineering Index Data Base).
Rept. for Jul 79-Jun 80,
William E. Reed. Jul 80, 196p
Supersedes NTIS/PS-79/0728 and NTIS/PS-78/0613. See also NTIS/PS-76/0203, NTIS/PS-77/0326, and PB80-812688.

The bibliography of worldwide research literature cites studies on telecommunication applications of microcomputers. Telephone, data transmission, teleprinters, facsimile communication, and communications controllers are among the applications cited. (This updated bibliography contains 191 abstracts, all of which are new entries to the previous edition.)

SAND-80-0588 PC **E01**/MF **A01**
Sandia National Labs., Albuquerque, NM.
Investigation into Interactive Graphics Data Base Exchange Via Gerber Data.
R. E. Parks. Mar 80, 18p
Contract EY-76-C-04-0789

Data representing the same interactive grahic design vary greatly from one graphics system manufacturer to another. Therefore, translating the data into a common form to effect data base exchange is a difficult problem. This study examines the use of the Gerber language as a common data form through which design data could be exchanged between unlike systems. For this study Applicon Graphic System was used cyclically to check retention or degeneration of the data integrity when the original design was extracted/defined in the Gerber language and reentered into the AGS utilizing various Gerber Interface Programs. The various parts of this study include the transferring of data not only in the 2D environment, but 2D to 3D and 3D to 2D. Even though plots of the files appear very similar, the individual data bases are very dissimilar. Programs, both present and future, that might supply needed information or design aids and characteristics would find it virtually impossible to do so from a data base lacking the sophistication and completeness of the original AGS data base. Man-machine hours required to bring the data base back to original quality would be extensive. The loss of data base integrity shown by this study was restricted to an AGS to AGS transfer. The loss could very easily be magnified if the transfer were between unlike systems. 8 figures. (ERA citation 05:022774)

9C. Electrical and Electronic Engineering

AD-A085 326/7 PC **A02**/MF **A01**
Electronic Systems Div Hanscom AFB MA
The Impact of VHSIC on Air Force Signal Processing.
Technical rept.,
Donald B. Brick, and John W. Hines. Mar 80, 9p
Rept no. ESD-TR-80-114

The functional characteristics of VHSIC-I and VHSIC-II as they affect Air Force signal processing systems are discussed. The Air Force has identified a number of system candidates for VHSIC application. These fall into three categories: 'nice-to-have,' 'need-to-have,' and 'needed-to-have-earlier.' Examples of the impact of a VHSIC-like capability on each of the three categories are discussed, and vice versa, with emphasis on the last of the three categories because it is the one that imposes the most stringent demands on future VHSIC chip designs and architectures. However, the 'nice to have' applications are not a luxury since they serve two very useful purposes: (1) to indicate that the VHSIC design approaches are valid and prolific in their applications; and (2) to provide early pay-off for the VHSIC effort plus applicational feedback to the designers. It is shown here that VHSIC-I can satisfy today's requirements, and, as presently forecast, VHSIC-II can meet 1980 requirements, and, only if extreme care is taken in architecture and chip design, can 1990 requirements be met with 1990 VHSIC's. The impacts of software/hardware/architectural tradeoffs, VHSIC system reliability, and future signal-processing systems design and commonality are discussed. (Author)

AD-A085 422/4 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
A Note on the Hamming Weighting of Linear-FM Pulses.
Journal article,
J. J. Gerald McCue. 18 Jun 79, 4p JA-4733,
ESD-TR-79-353
Contract F19628-80-C-0002
Pub. in Proceedings of the IEEE, v67 n1 p1575-1577 Nov 79.

No abstract available.

AD-A085 602/1 PC **A02**/MF **A01**
Harry Diamond Labs Adelphi MD
A Guide to the Electromagnetic Pulse Hardening of Open-Wire Systems to the Exoatmospheric Army Threat Environment.
Technical rept.,
Michael J. Vrabel, Robert A. Yescavage, and Loren D. Dillingham. Feb 80, 24p Rept no. HDL-TR-1910

A theoretical study of EMP response is presented for a family of open-wire systems. The goal is to provide the designer with an understanding of the performance of a number of hardening techniques. The hardening designs encompass both linear filter networks and filter-nonlinear component circuits. The results presented are a distillation of data from approximately 350 response curves. Although necessity demands a severe restriction in the number of permissible variables, the data are sufficiently information to impart to the EMP systems designer an understanding of the level of effort necessary to harden an open-wire system. (Author)

AD-A085 614/6 PC **A02**/MF **A01**
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Event Location Using Recursive Least Squares Signal Processing.
Webster P. Dove, and Alan V. Oppenheim. Apr 80, 6p
Contract N00014-75-C-0951, Grant NSF-ENG76-24117
Pub. in Proceedings of the IEEE International Conference of Acoustics Speech and Signal Processing (1980),9-11 Apr 80 p584-587.

The problem of locating the position of individual pulses within a group of overlapping pulses can be simplified by preprocessing the data to reduce the overlap. This paper proposes the use of Recursive Least Squares (RLS) prediction for this purpose. The pulse compression performance of two signals derived from the RLS algorithm is compared using all-pole data with different noise levels, and the effects of zeroes in the data and prefiltering are discussed. (Author)

AD-A085 624/5 PC **A02**/MF **A01**
Massachusetts Inst of Tech Cambridge Research Lab of Electronics

Artifacts in Alpha-Rooting of Images,
James H. McClellan. 1980, 7p
Contract N00014-75-C-0951
Pub. in IEEE International Conference on Acoustics, Speech, and Signal Processing, p584-587 9-11 Apr 80.

No abstract available.

AD-A085 752/4 PC **A04**/MF **A01**
Illinois Univ At Urbana-Champaign Decision and Control Lab
Scheduling and Coordination of Multiple Dynamic Systems.
Technical rept.,
Bruce Krogh. Dec 79, 75p Rept nos. DC-33, UILU-ENG-78-2261
Contract N00014-79-C-0424, Grant NSF-ECS79-19396
Also available as Rept. no. R-867.

Meeting the load on a large scale power system network involves the scheduling and control of multiple generating units with the primary goal of minimizing the total cost of generation. Many constraints and factors must be taken into account and problems of scheduling involve times scales from several years for future construction planning, to a year for maintenance scheduling, to daily or weekly scheduling of the units which are available for meeting the current demand. A totally integrated scheduling methodology taking into account all such factors involves computational requirements far beyond the practical limitations of computing technology. Consequently, each aspect of the problem has been previously investigated with the relationship to the other time scales being only heuristically and intuitively involved. (Author)

LA-8055-P PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Application of Superconducting Coils to VAR Control in Electric Power Systems: A Proposal.
H. J. Boenig, and W. V. Hassenzahl. Nov 79, 26p
Contract W-7405-ENG-36

During the last eight years, static VAR-control systems with thyristor-controlled, room-temperature reactors have been used in electrical systems for voltage control and system stabilization. In this proposal, we describe a new static VAR-control system that uses an asymmetrically controlled Graetz bridge and a superconducting dc coil. Preliminary studies indicate that the proposed system will have lower overall losses and that its capital cost and electrical characteristics are comparable to those of a conventional system. Three- and four-year programs for developing the electronic circuitry and superconducting coils for VAR control, culminating in the installation and testing of an approx. 40-MVAR system, are proposed. (ERA citation 05:020593)

PB80-808967 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Extra High Voltage Power Transmission. 1970-April, 1979 (Citations from the NTIS Data Base).
Rept. for 1970-Apr 79,
C. Gilbert Young. May 80, 78p
Sponsored in part by National Technical Information Service, Springfield, VA.

The design, construction and use of extra high voltage power transmission lines are discussed in the cited abstracts. Both underground and overhead lines are covered, as well as superconducting and resistive cryogenic lines. Health, safety and psychological aspects of the electric field, corona, ozone and acoustic effects of these lines are mentioned. New conductor, insulator, mounting, monitoring, control, lightning protection and other aspects of EHV power transmission are delineated. (Contains 59 citations)

9D. Information Theory

AD-A085 471/1 PC **A03**/MF **A01**
Naval Research Lab Washington DC
Properties of Cross-Entropy Minimization.
Memorandum rept.,
J. E. Shore, and R. W. Johnson. 1 Apr 80, 41p
NRL-MR-4189, AD-E000 431

The principle of minimum cross-entropy (minimum directed divergence, minimum discrimination information) provides a general method of inference about an unknown probability density when there exists a prior estimate of the density and new information in the form of constraints on expected values. Previous work has shown that cross-entropy minimization can be characterized axiomatically by a small set of consistency axioms. Our purpose in this paper is to collect in one place and prove various fundamental properties of cross-entropy minimization. We include examples, and we discuss general analytic and computational methods of finding minimum cross-entropy probability densities. An interesting aspect of the results presented in this paper is the interplay between properties of cross-entropy minimization as an inference procedure and properties of cross-entropy as an information measure. Cross-entropy's well-known and unique properties as an information measure in the case of arbitrary probability densities are extended and strengthened when one of the densities involved is the result of cross-entropy minimization. For example, cross-entropy does not in general satisfy a triangle relation involving three arbitrary probability densities. But in certain important cases involving densities that result from cross-entropy minimization, cross-entropy satisfies triangle inequalities and triangle equalities.

AD-A085 494/3 PC **A02**/MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Chemistry
A Performance Criterion for Information Theoretic Data Analysis,
J. L. Kinsey, and R. D. Levine. 12 Mar 79, 5p
AFOSR-TR-80-0397
Grant AFOSR-77-3135
Pub. in Chemical Physics Letters, v65 n3 p413-416, 1 Sep 79.

No abstract available.

9E. Subsystems

AD-A085 313/5 PC **A04**/MF **A01**
Illinois Univ At Urbana-Champaign Coordinated Science Lab
Design and Analysis of an NMOS Operational Amplifier with Depletion Loads.
Master's thesis,
Richard Dean Davis. Aug 79, 55p Rept nos. R-857, UILU-ENG-78-2250
Contract N00014-79-C-0424, Grant NSF-ENG78-11758

The MOS transistor has become the building block for LSI digital circuits in recent years. Its small device size and high fabrication yield have made it particularly attractive. Recently, however, the application of MOS technology to analog circuits has been studied. One particularly useful analog circuit is the operational amplifier. The ability to fabricate an all MOS operational amplifier on an LSI chip can increase the flexibility of many signal processing tasks, such as filtering, D/A and A/D conversion. In addition, the amplifier would be compatible with other MOS circuit elements. In this thesis a single channel NMOS operational amplifier with depletion loads is designed. Computer simulation using the SPICE circuit analysis program is used as a design aid and to evaluate the final design, as this lends itself easily to the study of parameter variations within the circuit. Of particular interest is the method of internal frequency compensation of the amplifier leading to design criteria for several small signal parameters. These small signal parameters are directly related to device geometry and D.C. bias conditions. Other characteristics and performance criteria of the amplifier are also discussed. (Author)

AD-A085 329/1 PC **A05**/MF **A01**
Illinois Univ At Urbana-Champaign Electromagnetics Lab
Analysis of Antenna Radomes by Ray Techniques. Part I. Point Source.
Final technical rept.,
S. W. Lee, V. Jamnejad, M. S. Sheshadri, and R. Mittra. May 80, 81p Rept nos. UIEM-80-2, UILU-ENG-80-2542
Contract N00019-79-C-0281

A new method for attacking the radome problem is presented in this report. It improves the standard radome analyses in the two aspects: the description of the incident field, and the curvature of the radome surface as explained below. The radome is normally situated in the near-field zone of the antenna, which may be a horn, a slot, or an array. Taking into consideration the finite antenna size, we approximately replace it by an array of discrete point sources, each of which radiates a spherical wave. This approximation is different from that used in conventional techniques in which the incident field from the antenna is approximately represented by a spectrum of plane waves, instead of spherical waves. In calculating the wave transmission through the radome, the curvature of the radome is invariably ignored in conventional analyses. Our approach, however, does treat the radome as a curved surface by calculating the transmission of a spherical wave via ray techniques. In this part of the report, only the point source situated inside the radome is studied. Extensive numerical results show that the curvature of the radome may significantly modify the field transmitted through the radome. This modification cannot be accounted for by conventional radome analyses.

AD-A085 358/0 PC **A04**/MF **A01**
Air Force Avionics Lab Wright-Patterson AFB OH
Microwave Characterization of the GaAs MESFET and Development of a Low Noise Microwave Amplifier.
Final rept. 6 Apr 78-15 Dec 79,
Mark C. Calcatera. Dec 79, 63p Rept no. AFAL-TR-79-1198

An adjustable microstrip matching technique has been developed using metallized ceramic squares (METCHIP). A good impedance transformation over a moderate bandwidth using METCHIP matching of a low noise GaAs FET amplifier stage in the 8 to 10 GHz frequency range has been carried out. An empirical model was developed for the METCHIP structure by modifying the transmission line model to account for fringing effects. An analysis of the overall circuit model showed a close correspondence with the actual measured amplifier characteristics.

AD-A085 429/9 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Use of Surface Acoustic Wave Reflective Array Compressors in Spectrum Analysis and Demodulation.
Journal article,
Russell R. Rhodes. 1979, 4p MS-5040, ESD-TR-79-343
Contract F19628-80-C-0002
Pub. in EASCON '79 Record, p283-285 Oct 79.

No abstract available.

AD-A085 431/5 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
A Surface Acoustic Wave Demodulator for MFSK Signals.
Journal article,
Don M. Boroson, Russell R. Rhodes, and Richard C. Williamson. 1979, 6p MS-5105, ESD-TR-79-347
Contract F19628-80-C-0002
Pub. in National Telecommunications Conference, p33.6.1-33.6.5 Nov 79.

No abstract available.

AD-A085 437/2 MF **A01**
Kappa Systems Inc Colorado Springs CO
Report on Contract F05611-76-90203. Volume II.
Final rept.,
G. J. Grimes. 1976, 78p
Contract F05611-76-90203
See also Volume 1, AD-A085 652.
Availability: Microfiche copies only.

For abstract see AD-A085 652.

AD-A085 474/5 PC **A03**/MF **A01**
Naval Research Lab Washington DC
Analysis of Conventional and Reflective Butler Matrices with Imperfect Components.
Interim rept.,
J. P. Shelton, and J. K. Hsiao. 18 Mar 80, 47p
NRL-8392, AD-E000 427

In a reflective Butler matrix the input ports are coincident with the output ports. Hence, all error com-

ponents produced by imperfect hybrid couplers accumulate at the single set of input/output ports, rather than being distributed at the separate sets of input ports and output ports as in the conventional Butler matrix. This report gives a precise scattering analysis of both conventional and reflective Butler matrices made up of imperfect hybrid couplers, and the effect on the performance of such matrices is computed. A computer program for carrying out the analysis is also given.

AD-A085 589/0 PC **A03/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
An Iterative Implementation for 2-D Digital Filters.
Technical note,
Dan E. Dudgeon. 6 Feb 80, 30p TN-1980-6, ESD-TR-79-331
Contract F19628-80-C-0002

A 2-D digital filter with a rational frequency response can be expanded into an infinite sequence of filtering operations. Each filtering operation can be implemented by convolution with a low-order 2-D finite-extent impulse response. This sequence of filtering operations can be viewed as an iteration where a new estimate of the output signal is formed from the previous estimate. If a convergence constraint is satisfied, the sequence of estimates will approach the desired output signal. In practice, the number of iterations is finite. Consequently, the frequency response that is actually realized by the iterative implementation is an approximation to the desired rational frequency response. (Author)

AD-A085 607/0 PC **A02/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Dual-Frequency EHF Ground-Terminal Antenna.
Technical note,
Michael L. Burrows. 3 Mar 80, 16p TN-1980-13, ESD-TR-79-329
Contract F19628-80-C-0002

A design is presented for an EHF ground-terminal antenna in the form of a dual-frequency 2-ft dish. The 20 GHz receive horn is at the prime focus. The 44 GHz transmit feed is a focussed array of 32 square horns at the vertex of the dish illuminating a dichroic ellipsoidal Cassegrain sub-reflector. The sub-reflector is nominally transparent at 20 GHz and nominally a perfect reflector at 44 GHz. The directive gains at the two frequencies are estimated to be 39.0 dB and 44.9 dB, respectively. The dichroic surface is a single layer metal sheet whose periodic perforations are designed to exhibit a two-frequency resonant behavior giving near perfect reflection at 44 GHz and near-perfect transmission at 20 GHz. This design allows some 32 W of transmitter power to be generated by combining the power of 32 individual 1 W solid-state amplifiers. The combining losses (and the hardware) of a waveguide combining tree are avoided by space combining the fields radiated by the 32 individually fed horns. (Author)

AD-A085 641/9 PC **A02/MF A01**
Army Electronics Research and Development Command Fort Monmouth NJ Electronics Technology/Devices Lab
Electroluminescent Display Technology.
Technical rept.,
M. Robert Miller, and Elliott Schlam. Apr 80, 12p Rept no. DELET-TR-80-9

The development of the current high contrast, sunlight legible, thin-film electroluminescent display technology will be reviewed and device structures and operating characteristics will be described. Drive and addressing considerations will be presented in relation to device types, power dissipation, multiplexing and viewability. An overview of the industry status will be given including device availability and problems remaining to be solved. Applications of the technology will be reviewed covering both user requirements and device capabilities. A survey of future prospects will cover improvements in efficiency, multicolor displays and various device configurations. (Author)

AD-A085 652/6 MF **A01**
Kappa Systems Inc Colorado Springs CO
Report on Contract F05611-76-90203. Volume I.
Final rept.,
G. J. Grimes. 1976, 74p
Contract F05611-76-90203
See also Volume 2, AD-A085 437.
Availability: Microfiche copies only.

The main goal of this project was to explore ways in which digital filters could be used for isopad seismic vibration control. This goal was formulated after many analog circuits were built and tested to give the appropriate amount of phase lead in the proper frequency bands. None of the analog circuits had been totally successful in giving the required amount of lead. Unfortunately, in the literature of digital filters, there is very little, if any, useful information concerning the phase characteristics of digital filters. The primary goal was to explore the phase characteristics of digital filters relative to the isopad control problem. The end goal of the isopad control problem is to execute various control loops, presumably one for each degree of freedom of the isopad, to control the isopad in real time using digital filters, either exclusively, or in conjunction with analog filters. It was originally conceived that the project would be carried out by developing software on the PDP11/45 and then down-line loading the program into the PDP11/03 computer which is based on the LSI-11 microprocessor. Thus, using microprocessor technology, it would be cost effective to use a controller per axis concept and the interaction or cross-coupling in the processors would be extremely well-defined by passing only the required parameters when needed between processors. This approach proved to be not feasible to put into practice because of the processing requirements of the filters.

AD-A085 708/6 PC **A08/MF A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Engineering
Effects of Adaptive Antenna Arrays on Broadband Signals.
Master's thesis,
William Artman Riski. Jun 80, 164p Rept no. AFIT/GE/EE/80-4

This paper develops a complex baseband model for an adaptive array with N isotropic elements and T tapped delay lines behind each element. Three aspects of arrays are represented: spatial and temporal propagation delays and the weighting coefficients. The model is used to determine the steady state effect of arrays on wideband signals. Optimum weights are calculated based on the noise covariance matrix produced by single and multiple narrowband jammers and single broadband jammers. It is shown that discrete spectral lines can be used to model a broadband jammer. For a jammer with 4% f0 bandwidth, this approximation yields a correlation function which is accurate to within 0.53%. For a linear, equally spaced adaptive array the output consists of the input signal and its first time derivative. This first derivative distortion is reduced by the addition of tapped delay lines only when the noise environment contains broadband jammers. This performance improvement is quantified by increased null depth. The improvement, for a 4% f0 bandwidth jammer, was 6.2 db with a jammer located at 10 degrees and 2.5 db for a jammer at 50 degrees. (Author)

AD-A085 751/6 PC **A02/MF A01**
Illinois Univ At Urbana-Champaign Applied Computation Theory Group
Area-Time Optimal VLSI Networks Based on the Cube-Connected-Cycles.
Technical rept.,
Franco P. Preparata, and Jean E. Vuillemin. Feb 80, 17p Rept nos. ACT-21, UILU-ENG-80-2207
Contract N00014-79-C-0424, Grant NSF-MCS78-13642
Also available as Rept. no. R-875.

This report presents designs for VLSI circuits computing Cyclic Shifts, Discrete Fourier Transforms, and Integer Multiplication, all based on a machine architecture, the Cube-Connected-Cycles CCC, introduced by the authors in (10). All of the designs match, to within a constant factor, the known theoretical lower bounds (3), (4), (8) for area X time sq products.

AD-A085 768/0 PC **A04/MF A01**
Westinghouse Research and Development Center Pittsburgh PA
Miniature Active Matrix Display.
Final rept. 31 Dec 77-30 Jul 78,
J. Murphy, and L. J. Sienkiewicz. 30 Jul 78, 75p
Contract DAAK70-77-C-0140

The purpose of this research is to take a step toward the development of a miniature flat panel display system in order to replace the miniature CRT now found in Helmet Mounted Displays. This research further attempts to advance projected uses in hand-held and weapon mounted target acquisition devices. The flat panel display would result in reductions in system size, volume, weight, power, voltage and cost relative to a CRT system. In addition, new system configurations would be possible as a result of the compactness of the flat panel system. Flat displays using solid state electronics and various display media have already been developed as commercial products. In most of these, discrete light emitting or modulating elements are electronically addressed and activated. However, when high resolution is required, the large number of such elements results in difficult problems relating to element addressing, electrical connections, duty cycle, and power requirements. Over the past seven years, an intensive program at Westinghouse on the development of thin film transistor (TFT) circuits has made it possible to incorporate active circuitry within each display element, and has made it further possible to provide addressing with peripheral scanner circuitry in the same planar substrate as the display.

AD-A085 785/4 PC **A02/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
High-Speed InP Optoelectronic Switch.
Journal article,
Frederick J. Leonberger, and Peter F. Moulton. 2 Aug 79, 4p JA-5012, ESD-TR-80-12
Contract F19628-80-C-0002
Pub. in Applied Physics Letters, v35 n9 p712-714, 1 Nov 79.

No abstract available.

AD-A085 791/2 PC **A02/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Controlling Adaptive Antenna Arrays with the Sample Matrix Inversion Algorithm.
Journal article,
Larry L. Horowitz, Wesley G. Brodsky, Howard Blatt, and Kenneth D. Senne. 21 May 79, 10p JA-4984, ESD-TR-80-5
Contract F19628-80-C-0002
Pub. in IEEE Transactions on Aerospace and Electronic Systems, vAES-15 n6 p840-848 Nov 79. Presented at ELECTRO 1979, New York, NY, 30 Apr 79.

No abstract available.

N80-25762/9 PC **A03/MF A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
An Alternate Algorithm for Correction of the Scanning Multichannel Microwave Radiometer Polarization Radiances Using Nimbus-7 Observed Data.
P. Gloersen, D. J. Cavalieri, and H. V. Soule. Apr 80, 27p NASA-TM-80672
Submitted for Publication.

The manner in which Nimbus-7 scanning multichannel microwave radiometer (SMMR) scan radiance data was used to determine its operational characteristics is described. The predicted SMMR scan radiance was found to be in disagreement at all wavelengths with a large area of average measured ocean radiances. A modified model incorporating a different phase shift for each of the SMMR horizontal and vertical polarization channels was developed and found to provide good data correlation. Additional study is required to determine the validity and accuracy of this model.

PAT-APPL-6-141 501 PC **A02/MF A01**
Department of the Air Force Washington DC
Fast Operating Switchable Operational Amplifier Driven Circuits.
Patent Application,
Grant H. Watkins. Filed 18 Apr 80, 16p AD-D007 289/2
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Faster switching speeds for switchable noise filters and faster sampling speeds for sample and hold

circuits are realized by means of an operational amplifier driven circuit in which excess feedback loop gain of the operational amplifier is used to reduce the effective value of resistance in the device's capacitor charging circuit. Two operational feedback loops are used, one or the other of which is switched into the circuit to effect either an open loop or a closed loop condition. The time required to charge the device's capacitor is a function of the ratio of the operational amplifier's closed loop gain divided by its open loop gain. (Author)

PAT-APPL-6-145 206 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
Cavity-Backed, Micro-Strip Dipole Antenna Array.
Patent Application,
H. Ellis, Jr. Filed 30 Apr 80, 15p N80-24511/1, NASA-CASE-MSC-18606-1
Contract NAS9-14000
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A flush mounted, microwave band antenna for high performance aircraft and space vehicles is disclosed. Features of the cavity-backed microstrip antenna include: (1) low cost construction; (2) microstrip elements in orthogonal dipole arrangement; and (3) circular polarized sum and difference radiation patterns. The microstrip antenna elements are fed through quadrature hybrids proceeded by a comparator hybrid.

PB80-198328 PC **A02**/MF **A01**
National Bureau of Standards, Washington, DC.
A Schottky Diode Bridge Sampling Gate.
Final rept.,
Arnold G. Perrey, and Howard K. Schoenwetter. May 80, 21p NBS-TN-1121

A Schottky diode bridge and associated gating and delay circuits have been designed to facilitate the measurement of low level signals preceded by large signals without overdriving the measuring instrument. This measurement problem occurs in testing or evaluating operational amplifiers, digital-to-analog converters, sample/hold amplifiers and other similar active circuits.

10. ENERGY CONVERSION (NON-PROPULSIVE)

10A. Conversion Techniques

AD-A085 573/4 PC **A03**/MF **A01**
Construction Engineering Research Lab (Army) Champaign IL
Comparison of Building Loads Analysis and System Thermodynamics (BLAST) Computer Program Simulations and Measured Energy Use for Army Buildings.
Interim rept.,
Dale Herron, Larry M. Windingland, and Douglas C. Hittle. May 80, 43p Rept no. CERL-IR-E-161

This report describes an analysis of actual measured energy consumption vs energy consumption simulated by the Building Loads Analysis and System Thermodynamics (BLAST) computer program. A dental clinic and a battalion headquarters and classroom building were modeled; comparisons of the BLAST output using onsite weather and measured energy consumption data are made for the two buildings. The report includes tables and figures describing how well the BLAST program calculates the building's internal electrical load and, by comparing simulation results with measured values, predicts the building's cooling load and chiller performance as described by the chiller electrical energy consumption. (Author)

ALO-12032-1 PC **A04**/MF **A01**
Acurex Corp., Mountain View, CA. Alternate Energy Div.
Further Development of a Low Cost Solar Panel. Semiannual Technical Progress Report, September 28, 1979-March 31, 1980.
T. Muller, D. Erskine, R. Short, and R. Torok. Apr 80, 74p
Contract AC04-79AL12032

The primary objective of this phase of the Low Cost Solar Panel (LCSP) development is to fabricate, test, and gain practical operational experience on a full-scale prototype panel section, with emphasis on the unglazed configuration. The program includes design refinement, fabrication of full-scale prototypes by hand and semiautomated equipment, subscale and full-scale structural testing, outdoor performance tests, and an assessment of manufacturing requirements and production costs. The report describes the LCSP concept in more detail, the project approach and the more significant accomplishments to date. (ERA citation 05:022222)

ASE-4524 PC **A02**/MF **A01**
American Science and Engineering, Inc., Cambridge, MA.
Development of a Second Generation Concentrating Tracking Solar Collector. Final Report.
31 Mar 80, 10p
Contract EM-78-C-04-4275

Results are presented of testing done on the Second Generation Concentrating Tracking Solar Collector. This includes testing of both the single tube collector shown in Figure 1 and the 4' x 8' collector shown in Figure 2. The testing was performed between April 1979 and February 1980 under various conditions. Air conditions included clear air, haze and smog, and ambient temperature varied widely. The diversity of testing conditions provided a realistic evaluation of collector performance. (ERA citation 05:022223)

CONF-7805162-P2 PC **A19**/MF **A01**
Florida Solar Energy Center, Cape Canaveral.
Proceedings of Solar Energy Consumer Protection Workshop. Volume Two. Workshops A, B, C, and D.
Jan 80, 426p
Contract EM-78-C-01-5174
Solar Energy Consumer Energy workshop, Atlanta, GA, USA, 3 May 1978.

Edited discussions from four individual workshops are presented. These workshops were: standards setting, testing, certification, and labeling; trade licensing laws and training programs, building codes, and consumer information and education. (ERA citation 05:020272)

CONF-800343-1 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Engineering Audits at Minnesota State-Owned Facilities.
E. Hirst. 1980, 4p
Contract W-7405-ENG-26
Conference on state energy audit impact '80, Norcross, GA, USA, Mar 1980.

Results obtained from detailed engineering audits performed at 41 institutions operated by the State of Minnesota are analyzed. These institutions include community colleges, state universities, office buildings, hospitals, and Department of Transportation regional facilities. The audits cover 270 buildings and include 2010 individual energy conservation recommendations. Implementing all these suggestions would cut energy use by 93 MBtu/ft exp 2 -audited, equivalent to at least 30% of baseline energy use at these institutions. The cost to implement these measures is almost $2/ft exp 2 with an average payback period of less than eight years (at 1978 fuel prices). (ERA citation 05:020798)

COO-4881-12 PC **A09**/MF **A01**
Prototech Co., Newton Highlands, MA.
Energy Savings by Means of Fuel Cell Electrodes in Electro-Chemical Industries. Annual Report for August 1, 1978-July 31, 1979.
R. J. Allen, W. Juda, R. W. Lindstrom, and H. G. Petrow. 31 Oct 79, 200p
Contract ET-78-C-02-4881

The objectives of the subject program are: to evaluate experimentally, on a laboratory scale, energy and cost savings in electrowinning of zinc by substituting, for the conventional lead anode, a Prototech proprietary hydrogen anode operating on pure and impure feeds; to similarly evaluate experimentally, again on a laboratory scale, voltage, and thus energy savings in chlor-alkali membrane cells by substituting, for the conventional steel cathode, a Prototech proprietary air cathode; to consult with Lockheed and Lawrence Livermore Laboratory (LLL) on the subject of suitable air electrodes for metal/water/air batteries; and prepare cost estimates of all processes investigated based on laboratory results. (ERA citation 05:022598)

DOE/CS-0146 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Energy Conservation Programs for Schools, Hospitals and Buildings Owned by Units of Local Government and Public Care Institutions. Report to Congress for FY 1979. Annual Report.
1979, 12p

The National Energy Conservation Policy Act of 1978 (NECPA) authorized the Department of Energy (DOE) to implement multi-sector energy conservation grant programs aimed at assisting public and private non-profit schools and hospitals, and units of local government and public care institutions. This Report, describes DOE efforts during FY 1979 to establish and implement the programs and procedures required under Title III NECPA. The Report contains discussions of the program's legislative background and authorization, a description of the Title III programs and the management system developed for the programs, and program accomplishments in FY 1979 and goals for FY 1980. As appendices to the report DOE has included the management plans for Phase I and Phase II and the regulation governing the programs. During FY 1979, DOE completed all preparatory work for such grant programs, including the development of proposed and final regulations for the operation of the program, and developed comprehensive management plans for the coordination and execution of program activities. By the end of FY 1979, DOE had succeeded in full implementation of Phase I, granting approximately $26 million to States and territories to support the conduct of preliminary energy audits and energy audits. DOE is currently reviewing and acting upon State Plans for the implementation of Phase II, technical assistance and energy conservation measures programs, and expects to award some $158 million in grants to institutions and local governments during the first three months of calendar year 1980. As of December 10, 1979 DOE has approved 23 State Plans, and intends to complete the approval of the remaining State Plans by January 1, 1980. These milestones, accomplished in less than one yar of NECPTA's enactment, marked the initiation of both program phases. (ERA citation 05:020799)

DOE/CS-0151 PC **A12**/MF **A01**
Department of Energy, Washington, DC. Assistant Secretary for Conservation and Solar Energy.
Comprehensive Program and Plan for Federal Energy Education, Extension and Information Activities. Third Report to Congress, P.L. 95-39, Title V: National Energy Extension Service Act.
Mar 80, 265p

The Federal energy extension and information activities program focuses on the need to save energy and switch to renewable fuel sources such as solar, wind, wood, or geothermal power. Outreach activities deliver information and technical assistance to communicate the importance of changes in energy consumption patterns, the energy-efficiency and renewable fuel options available, and the associated short- and long-term cost savings. The focal point of this third CPP is the statement of 12 principles as policy to guide Federal agencies in the coordination and management of their activities involving energy education, extension, and/or information. (ERA citation 05:020845)

DOE/CS/20289-1 PC **A05**/MF **A01**
Ross, Hardies, O'Keefe, Babcock and Parsons, Chicago, IL.
Study of the Impacts of Regulations Affecting the Acceptance of Integrated Community Energy Systems: Public Utility, Energy Facility Siting and Municipal Franchising Regulatory Programs in the United States. Preliminary Background Report.
D. A. Feurer, C. L. Weaver, K. C. Gallagher, D. Hejna, and K. J. Rielley. Jan 80, 90p

Contract AC02-78CS20289

This report is one of a series of preliminary reports describing the laws and regulatory programs of the United States and each of the 50 states affecting the siting and operation of energy generating facilities likely to be used in Integrated Community Energy Systems (ICES). Public utility regulatory statutes, energy facility siting programs, and municipal franchising authority are examined to identify how they may impact on the ability of an organization, whether or not it be a regulated utility, to construct and operate an ICES. This report describes laws and regulatory programs in the United States. Subsequent reports will (1) describe public utility rate regulatory procedures and practices as they might affect an ICES, (2) analyze each of the aforementioned regulatory programs to identify impediments to the development of ICES, and (3) recommend potential changes in legislation and regulatory practices and procedures to overcome such impediments. (ERA citation 05:019036)

DOE/CS/20289-5 PC **A03**/MF **A01**
Ross, Hardies, O'Keefe, Babcock and Parsons, Chicago, IL.
Study of the Impacts of Regulations Affecting the Acceptance of Integrated Community Energy Systems: Public Utility, Energy Facility Siting and Municipal Franchising Regulatory Programs in Arkansas. Preliminary Background Report.
D. A. Feurer, C. L. Weaver, K. C. Gallagher, D. Hejna, and K. J. Rielley. Jan 80, 50p
Contract AC02-78CS20289

The Arkansas state constitution contains no provision dealing with public utility regulation. Title 73 of the Arkansas Statutes specifically provides for the regulation of public utilities. The Arkansas Public Service Commission is established by statute as a subagency of the Department of Commerce and is responsible for regulating electric, steam heating, and certain other kinds of utilities. The Commission consists of three members, each appointed by the governor with the approval of the Senate for a term of six years. The Commission has authority over all matters pertaining to the regulation and operation of gas companies, electric companies, and hydro-electric companies among other utilities enumerated in the statute. The role of local governments in the regulation of public utilities has been reduced by recent legislation. Municipal councils formerly had the power to regulate ratemaking for investor owned utilities operating within their boundaries. However, as a result of 1977 amendments to the Public Utilities Act, ratemaking for privately owned electric, gas, telephone, and sewer utilities is now within the exclusive jurisdiction of the Public Service Commission. Public utility regulatory statutes, energy facility siting programs, and municipal franchising authority are examined to identify how they may impact on the ability of an organization, whether or not it be a regulated utility, to construct and operate an ICES. (ERA citation 05:019039)

DOE/CS/20289-6 PC **A04**/MF **A01**
Ross, Hardies, O'Keefe, Babcock and Parsons, Chicago, IL.
Study of the Impacts of Regulations Affecting the Acceptance of Integrated Community Energy Systems: Public Utility, Energy Facility Siting and Municipal Franchising Regulatory Programs in California. Preliminary Background Report.
D. A. Feurer, C. L. Weaver, K. C. Gallagher, D. Hejna, and K. J. Rielley. Jan 80, 56p
Contract AC02-78CS20289

The Constitution of the State of California grants to the Legislature control over persons and private corporations that own or operate a line, plant, or system for the production, generation, or transmission of heat, light, water, or power to be furnished either directly or indirectly to or for the public. The Constitution establishes the Public Utilities Commission and grants certain specific powers to the PUC, including the power to fix rates, establish rules and prescribe a uniform system of accounts. The Constitution also recognizes that the Legislature has plenary power to confer additional authority and jurisdiction upon the PUC. The Constitution prohibits regulation by a city, county, or other municipal body of matters over which the Legislature has granted regulatory power to the PUC. This provision does not, however, impair the right of any city to grant franchises for public utilities. The California legislature has enacted the California Public Utilities Code and has designated the PUC as the agency to implement the regulatory provisions of the Code. The Public Utilities Commission consists of five members appointed by the governor and approved by the senate, a majority of the membership concurring, for staggered 6-year terms. Certain limited powers over the conduct of public utilities may still be exercised by municipalities. Public utility regulatory statutes, energy facility siting programs, and municipal franchising authority are examined to identify how they may impact on the ability of an organization, whether or not it be a regulated utility, to construct and operate an ICES. (ERA citation 05:019040)

DOE/CS/20289-8 PC **A04**/MF **A01**
Ross, Hardies, O'Keefe, Babcock and Parsons, Chicago, IL.
Study of the Impacts of Regulations Affecting the Acceptance of Integrated Community Energy Systems: Public Utility, Energy Facility Siting and Municipal Franchising Regulatory Programs in Connecticut. Preliminary Background Report.
D. A. Feurer, C. L. Weaver, K. C. Gallagher, D. Hejna, and K. J. Rielley. Jan 80, 62p
Contract AC02-78CS20289

The Connecticut statutes expressly provide for the regulation of public utilities. As of January 1, 1979, responsibility for the regulation of utilities is vested in the Public Utilities Control Authority (PUCA). Formerly such authority was exercised by the Public Utilities Commission which has been abolished and replaced by the PUCA. The Public Utilities Act provides that the PUCA is to consist of five members appointed by the governor with the advice and consent of both houses of the general assembly. It should be noted that statutory references to the Public Utilities Commission are deemed to mean the Public Utilities Control Authority. The statute gives only a minor role to local government in regulating public utilities. Public utility regulatory statutes, energy facility siting programs, and municipal franchising authority are examined to identify how they may impact on the ability of an organization, whether or not it be a regulated utility, to construct and operate an ICES. (ERA citation 05:019043)

DOE/EIA-0205/1 PC **A03**/MF **A01**
Department of Energy, Washington, DC. Energy Information Administration.
Energy Information Referral Directory.
Jan 80, 34p

The National Energy Information Center (NEIC) provides energy information and referral assistance to federal, state, and local governments, the academic community, business and industrial organizations, and the general public. The two principal functions related to this task are: (1) operating a general-access telephone line, and (2) responding to energy-related correspondence addressed to the Energy Information Administration (EIA). To assist the NEIC staff in directing inquiries to the proper office within the Department of Energy (DOE) or other federal agencies, the Energy Information Referral Directory was developed. The arrangement of the Directory is topical. The office of primary interest for a particular activity in DOE or other agencies is listed. Specific subtopics (e.g., building and community systems, appropriate technology) within each broad category are indicated by a bullet symbol. In addition, each subtopic is assigned an alpha-numeric designation for use in the accession of entries from the index. Most entries provide an abbreviated office address. For the complete address, consult the Building Location Index. Following the name and title is the DOE routing symbol which refers to the organization and is part of the mailing address. To request information from EIA, contact first the National Energy Information Center: by mail, 1726 M St., NW 20461; by phone, Statistical Info., (202)-634-5610; EIA Publications, (202)-634-5694. (ERA citation 05:018909)

DOE/EV-0059 PC **A06**/MF **A01**
SRI International, Menlo Park, CA.
Community Impediments to Implementation of Solar Energy.
M. D. Armstrong, and J. E. Armstrong. Nov 79, 112p
Contract W-7405-ENG-48

The complete array of institutional problems expected to energy when solar technology are implemented on a national scale is assembled. The findings of the study are presented in two formats. First, the results are organized by the time frames of delays in solar implementation caused by the inherent difficulties a national energy policy would encounter in changing the way a given institution responds to specific solar technologies. Delay categories of 10 years or more, 6 to 8 years, and 3 to 5 years were selected; all were assigned under the assumption that a strong national policy promoting adoption of solar technologies would be in effect. The second format constitutes a description of the difficulties at the community level, associated with implementing each solar technology. (ERA citation 05:017483)

DOE/EV-0070 PC **A03**/MF **A01**
Department of Energy, Washington, DC. Div. of Technology Assessments.
Technology Assessment of Productive Conservation in Urban Transportation. Project Description for Fiscal Years 1980, 1981.
Dec 79, 32p

An investigation of the potential environmental, health, and safety impacts of various alternative productive conservation strategies is presented. The technology assessment identifies internally consistent (mutually reinforcing policy or technology elements following a specific theme) productive conservation strategies which will aid in the reduction of the US dependence on petroleum in urban transportation; compares analytically the energy savings and environmental impacts of the various productive conservation strategies; and analyzes the issues and the barriers which may constrain these productive conservation strategies from becoming effective. Each strategy is discussed. Major tasks that occur during 4 phases are discussed, e.g., data collection, model assembly, impact criteria; in-place policy analysis; analysis of alternative strategies; and documentation. (ERA citation 05:019015)

DOE/HCP/M8656-02 PC **A10**/MF **A01**
JRB Associates, Inc., McLean, VA.
Resource File: Practical Publications for Energy Management, Edition III.
Mar 80, 218p
Contract EM-76-C-01-8656

The Resource File is an in-depth bibliography of 166 practical and action-oriented energy conservation publications and materials. It is a reference tool, designed for Federal, state, and local energy managers or people who are asked to recommend how-to conservation guides to the public. Each listing describes a publication's intended audience and provides a summary of its contents. Included are operations and maintenance manuals, lifecycle costing handbooks, home insulation manuals, films on fuel-saving driving techniques, and courses devoted exclusively to home weatherization. 166 items. (ERA citation 05:020846)

DOE/TIC-10203(App.B) PC **A06**/MF **A01**
Department of Energy, Washington, DC. Office of Analytical Services.
National Energy Plan II. Appendix B: US Energy Projections.
May 79, 105p

The Second National Energy Plan (NEP-II) which President Carter forwarded to the Congress on May 7, 1979, is replete with forecasts of the Nation's energy future and the impacts of that future on the American way of life. The analyses which form the basis of those forecasts are extensive and highly detailed. The reflection of these analyses in the basic NEP-II document is necessarily brief, in order that the basic document be readable, and also that the reader may maintain an appropriate perspective on the larger issues at hand. The reader should not be beguiled by the complexity and detail of computer models, nor assume that they are black boxes from which truth will some-

how emerge, or which will conceal bias. It is the insights into the behavior of enery markets and perceptions of the forces that will shape those markets in the future, which drive the results. Often, those insights and perceptions must rely heavily on judgment, since basic truths and detailed data are lacking. In order that the reader may judge for herself or himself the reasonableness of the forecasts and estimated in NEP-II, this appendix describes in detail far greater than would be possible in the NEP-II report itself, the assumptions and the methods of analysis used to generate the NEP-II results. The scenarios for NEP-II are designed to illustrate two major areas of uncertainty affecting national energy planning: world oil prices; and domestic supply/demand uncertainties. (ERA citation 05:017781)

DOE/TIC-10203(App.C) PC **A05**/MF **A01**
Department of Energy, Washington, DC. Office of Analytical Services.
National Energy Plan II. Appendix C: Energy and the Economy.
May 79, 95p

This appendix discusses the interaction between energy and the economy in more detail than was permitted in NEP-II. Specifically, interactions between energy and the economy are analyzed in four areas: (1) macroeconomic analysis of higher oil prices; (2) macroeconomic impacts of the President's April 1979 oil price decontrol and tax proposals; (3) regional macroeconomic impacts of higher oil prices; and (4) impacts on individuals of higher oil prices. The analysis in each of the four above areas was performed in parallel prior to completion of the world oil price analysis described in Appendix A. Assumptions related to price and quantity of US oil imports are thus not consistent among the four studies. Results of the studies therefore cannot easily be compared with each other. The major models employed in this study are the following: The Data Resources, Inc. (DRI) macroeconomic model and the Dale W. Jorgenson Associates/Brookhaven National Laboratory model are the main models used in the macroeconomic analyses of the first section. The DRI energy model and the Bureau of Labor Statistics (BLS) Input-Output model were also used extensively. The regional impacts in the second section were estimated with the Chase Econometric Associates, Inc. (CEAI) regional model. The final section dealing with individual impacts utilized the Energy Information Adminstration's MATH/CHRDS model. (ERA citation 05:017782)

DOE/TIC-11160 PC **A03**/MF **A01**
Department of Energy, Washington, DC. Assistant Secretary for International Affairs.
Foreign Direct Investment in US Energy Sources and Supplies.
Apr 78, 30p

Foreign direct investment transactions in US energy sources and supplies for 1976 and 1977 are reported. It includes the direct, indirect, or a combination of direct and indirect ownership of 10% or more of the voting stock of an incorporated US business enterprise or the equivalent interest in an unincorporated US business enterprise. Summaries are given for the petroleum and natural gas industries, the coal industry, the nuclear fuel cycle, and alternative energy sources. (ERA citation 05:022488)

DOE/TIC-11169 PC **A03**/MF **A01**
Department of Energy, Washington, DC.
Energy Supply Initiatives.
15 May 78, 28p

This document presents a set of supply initiatives designed to improve the Nation's capability to commercialize new energy-supply technologies. These initiatives were to be funded from offsetting adjustments within the Department's budget and build upon the National Energy Plan to ensure a balanced supply picture beyond the mid-1980's. The proposed supply initiatives fall under four categories: synthetic liquids and solids; new sources of natural gas; renewable energy sources; and removal of institutional barriers. (ERA citation 05:022505)

EPRI-PS-79-5-LD PC **A07**/MF **A01**
Electric Power Research Inst., Palo Alto, CA.
Energy Economic Projections for the 1979 Overview.
L. D. Cleary. Sep 79, 130p

Each year the EPRI Planning Staff publishes an overview to the 5-year research and development program plan. This report elaborates on and documents key energy demand and supply, economic, and financial issues analyzed in the Overview and Strategy 1980-1984 Research and Development Program Plan, EPRI--1141-PS. The report begins with a summary and expansion of energy and economic issues presented in the planning factors section of the Overview keyed to ETA-MACRO and WEM results. It is followed by an alternative view on the benefits of R and D planning. Next, key assumptions used in the models are outlined. Finally, sensitivity cases explore the implications of a moratorium on the construction of new nuclear plants in the US. Copies of the ETA-MACRO computer input and output from the Overview scenarios are available. 21 references, 25 figures, 24 tables. (ERA citation 05:020741)

EUR-6679 PC **A03**/MF **A01**
Nijverheidsorganisatie TNO, Delft (Netherlands). Fibre Research Inst.
Energy Savings in Paper Making by Means of Increased Water Removal in the Press-Section. Final Report.
H. A. Westra. 1980, 29p
U.S. Sales Only.

Research on the pressing process in the manufacture of paper and board in order to decrease the amount of water that has to be removed by means of evaporation, which is a much more energy consuming process, is described. The first phase of the project was comprised of a theoretical analysis of the processes taking place in a press and development of an experimental technique for determination of the material properties which exert an influence upon these processes. (ERA citation 05:019026)

HNEI-80-01 PC **A04**/MF **A01**
Hawaii Natural Energy Inst., Honolulu.
Heat Recovered from Domestic Refrigerator for Water Heating. Final Project Report.
J. C. S. Chou. Dec 79, 67p
Contract EM-78-G-03-1938

The concept of adding a water-cooled condenser to household refrigerator for preheating domestic hot water was tested in laboratory by installing a 2 1/2-in.-diameter by 11 in.-length water-cooled condenser in a 16-ft exp 3 top-freezer refrigerator. The condensing vapor may be directed through either the water-cooled condenser or the existing air-cooled condenser. At the normal operation, the useful heat gain of warm water in a 30-gallon storage with 1.9 in. thick fibrous glass wool insulation was about 2 kWh. Heat balance indicated that the energy recovery can be much higher if a water-cooled compressor can be incorporated into the system. For the popular 16-ft exp 3 top-freezer baseline model, it is possible to recover 3.5 kWh per day with water-cooled condenser, water-cooled compressor, and well-insulated storage tank. Because of the difficulty of having a simple design of the heat-recovery device for various models of refrigerators, besides the high labor cost of inserting the device into an existing system, modification of any existing household refrigerator with the water-cooled condenser as described in this report is not recommended. However, if such a device can be provided as an optional accessory of a new refrigerator, the system could be economically attractive to homeowners. (ERA citation 05:018994)

HNEI-80-02 PC **A05**/MF **A01**
Hawaii Natural Energy Inst., Honolulu.
Energy Self-Sufficiency Plan for County of Hawaii: Energy-Demand Patterns and Projections.
Y. K. Hahn. Jun 79, 89p
Contract EM-76-F-01-8163

The primary purpose of this study is to obtain for the next decade until 1990, energy-demand forecasts for the County of Hawaii. To do so, however, requires first-hand knowledge on energy-use patterns of the island community. To accomplish this, the study first is devoted to the analysis of energy-use patterns, covering four years (1975-1978). The energy-use patterns are analyzed in terms of energy-supply sources, energy use by types, and by end users. The end users are broadly categorized into four categories: transportation, industrial, commercial, and residential sectors. Electrical generation is treated as a distinctive primary energy-using sector. For the sake of expediency, the transportation sector includes all means of mobility, including air transportation. This grouping also means automobile fuel used by private motorists, commercial bus fleet, and industrial fleet. Categorization of industrial, commercial, and residential sectors are adopted from customer categorization used by Hawaii Electric Light Company. The second part of the study takes on energy-demand projections by sectors identified above. Three projection levels (high, intermediate, and low) are made covering up to the year 2000. Assumptions made in each projection level are elaborated upon. 1977 is used as the base year since data available for 1978 were incomplete preliminary data. (ERA citation 05:020742)

INIS-mf-4741 PC **A05**/MF **A01**
Norges Tekniske Vitenskapsakademi, Trondheim.
Energy and Other Resources.
I. Th. Rosenqvist. 76p
In Norwegian.
U.S. Sales Only.

It is pointed out that inorganic mineral raw materials, usually called ores, do not form a separate geological class, with a strictly defined limit in quantity. The raw materials are in fact present in continuously variable concentrations and amounts with differing geographical distribution. It is only the richest occurrences which are regarded as resources and exploited. The cone concept of available material is presented, where the amount of material available increases as the work invested is increased, but the profitable ore is represented only by the apex of the cone. In applying this idea to fossil fuels the concept must be modified to a 'pear', since the energy invested in retrieving the fuel must not exceed the energy content of the fuel. Renewable energy sources are also discussed, and it is pointed out that geothermal energy should not be regarded as renewable. It is pointed out, too, that, unless breeder reactors are introduced, the fossil fuel resources will give more energy than uranium, and probably cheaper. (Atomindex citation 11:500554)

LA-UR-80-848 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
How Can Energy-Efficient Structures Compete in an Inefficient Energy Market.
S. Noll. 1980, 11p CONF-800429-1
Contract W-7405-ENG-36
Institute of Gas Technology conference on future alternatives in residential and commercial space conditioning, Chicago, IL, USA, 14 Apr 1980.

The only way resources can be efficiently allocated in our market system is if prices of resources, goods, and services properly reflect their true value to society. However, because of (a) imperfections in the pricing mechanisms that currently influence private-sector decision making; (b) the difference in planning horizons between individuals and government; and (c) the external benefits that would accrue to society from energy-conscious decision making by individuals, it is apparent that there exists a substantial underinvestment in advanced-conservation and renewable-resource building technologies. Even if domestic energy prices were deregulated to reflect world market prices (now determined by OPEC) it is likely that underinvestment in energy-conscious design would still occur. For that reason, the only way that energy-conscious design will be implemented to the extent warranted is if a concerted political commitment is made to such a program at the Federal, state, and local levels. Such a commitment is not without precedent. The experiences of Davis and San Diego, California, and the TVA exemplify the extent to which energy conservation and renewable-resource development can be carried out if political leadership and support is established. It is known that technologies and design solutions for energy-efficient buildings are available today and are cost-effective. What remains to be seen is whether the political leadership of the United States will fully recognize the sensibility of a concerted conservation and renewable-energy-re-

source program for buildings as opposed to continued attempts at increasing energy production to supply an energy-inefficient-building inventory. 16 references. (ERA citation 05:018980)

N80-25796/7 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Heating a Fluid in Full Flow Inside a Horizontal Cyclindrical Pipe Using Solar Energy Aquecimento de Um Fluido Em Escoamento Completamente Estabelecido No Interior de Um Tubo Cilindrico Horizontal Usando Energia Solar.
M.S. Thesis.
S. Cardoso. Feb 80, 27p INPE-1680-TDL/020
Text in Portugese; English Summary.

The transfer of heat in a stead laminar flow inside an horizontal cylindrical tube under solar radiation heating is discussed. It is supposed that the tube at rest and that the flow is fully developed to its profile. The mathematical analysis is limited to an analytical solution of the energy equation adjusted for the system. The angular, radial, and axial distributions of temperature are presented along with variations of the Nusselt and Peclet numbers as a function of the axial coordinate.

ORNL/TM-7078 PC **A07**/MF **A01**
Oak Ridge National Lab., TN.
Review of Legal and Institutional Issues in the Use of Decentralized Solar Energy Systems.
M. Schweitzer. Apr 80, 143p
Contract W-7405-ENG-26

The legal and institutional issues involved in the use of decentralized solar energy systems are examined for the purpose of advising government planners and policymakers, the solar industry, solar researchers, and prospective solar users of present and potential impediments and incentives to solar commercialization. This information was gathered primarily through a comprehensive literature review, with supplementary data provided through interviews with representatives of organizations active in the solar field. Five major issue areas were identified in the course of this study: (1) prohibitions on the use of solar equipment, (2) regulation of the production and placement of solar systems, (3) access to sunlight, (4) financial incentives and impediments to the use of solar technologies, and (5) the public utility-solar user interface. Each can be important in its impacts on the incidence of solar usage. The major actors involved with the issues identified above represent both the private and public sectors. Important private sector participants include solar manufacturers and installers, labor unions, lending institutions, utility companies, solar users themselves, and other community property owners. In the public sector, local, state, and federal governments are all capable of acting in ways that can influence the solar commercialization effort. Implementation options are available for all levels of government seeking to take an active role in addressing the previously mentioned legal and institutional issues. The appropriate actions will vary from federal to state to local governments, but each level can be important in removing existing barriers and creating new incentives for solar use. (ERA citation 05:018559)

PB80-193162 PC **A04**/MF **A01**
California Energy Commission, Sacramento.
California's Solar Energy Tax Credit: An Analysis of Tax Returns for 1977.
Staff rept. (Final),
Diana Waldie Rains. Sep 79, 56p CAEC-69, CAEC-500-79-012

In 1977, the California Legislature established a 55 percent state income tax credit to encourage the use of solar energy systems in homes and businesses. Since enactment of the California Solar Tax Credit, over 40,000 taxpayer households have installed a solar energy system for water heating (pool and domestic), space conditioning (active and passive) or combined solar energy systems. Using statistical tabulations, the California Energy Commission has analyzed the results of the first year of the credit. These results are presented in terms of the number, type, total cost and geographical distribution of the credits. In addition, a breakdown by type of solar energy system installed and the distribution of credits across income groups are also tabulated.

PB80-193691 PC **A08**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Panel Reports of the Session of the Workshop on Coal for California (1st) Held at Pajaro Conference Center, Watsonville, California on October 1-5, 1978.
Consultant rept. (Final).
May 80, 161p CAEC-48, CAEC-300-80-020
Sponsored in part by Department of Energy, Washington, DC.

The panel examined end-uses of coal in California, mine-mouth conversion, advanced concepts and use of Alaskan coal, environmental effects, public acceptance, finance, and legislation and regulation.

PB80-193725 PC **A04**/MF **A01**
California Energy Commission, Sacramento.
Uranium Resources: A Review of Estimation Methodologies.
Consultant rept. (Final),
Stephen J. Sullivan. May 80, 71p CAEC-50, CAEC-300-80-025

Several methods for estimating recoverable resources are reviewed. These fall into two categories. Explicit models yield the amount and distribution of uranium ore on the basis of a known physical characteristics, such as rock type. Implicit models yield resources on the basis of an historical trend, such as annual production over time. Other methods are used to estimate subeconomic deposits. None of the methods is clearly superior; assumptions and procedures in each of the methods are identified, and recent resource estimates are presented.

PB80-194426 Not available NTIS
National Bureau of Standards, Washington, DC.
A Comparison of Test Results for Flat-Plate Water-Heating Solar Collectors Using the Bundesverband Solarenergie (BSE) and ASHRAE Procedures.
Final rept.,
J. P. Jenkins. 1979, 5p
Sponsored in part by Department of Energy, Washington, DC.
Pub. in Proceedings of the International Congress International Solar Energy Society, Atlanta, Georgia, May 28-June 1, 1979, Paper in SUN II 1, p365-369 1979.

The German Bundesverband Solarenergie (BSE) Working Group recently adopted and published a procedure for testing solar collectors based on thermal performance. Research facilities for testing flat-plate water-heating collectors have been built at NBS in accordance with the BSE procedure and the existing ASHRAE Standard 93-77. The purpose of this paper is to describe the BSE test procedure and compare experimental test results with those obtained using the existing ASHRAE Standard 93-77. Included is a description of the collector test facilities at NBS and the results obtained from testing five commercially available flat-plate water-heating collectors using both procedures.

PB80-195316 PC **A03**/MF **A01**
Johns Hopkins Univ., Laurel, MD. Applied Physics Lab.
Energy Programs at the Johns Hopkins University Applied Physics Laboratory.
Quarterly rept. Jan-Mar 80.
May 80, 48p JHU/APL/EQR/80-1
Contracts DOE-EX-76-A-36-1008, DE-A101-79-ET27025
See also report dated Feb 80, PB80-163686.

Research projects dealing with the following topic areas are discussed: Geothermal energy development planning and technical assistance; Operational research, hydroelectric power development; Seismotectonic investigation; Energy conversion and storage techniques.

PB80-197759 PC **A05**/MF **A01**
Office of Technology Assessment, Washington, DC.
Conservation and Solar Energy Programs of the Department of Energy: A Critique.
Jun 80, 81p OTA-E-120
Library of Congress catalog card no. 80-600092.

This report is in response to a request from the House Committee on Science and Technology. It reviews DOE's solar and conservation goals and the strategies for meeting them. Management and institutional issues requiring DOE or Congressional attention are identified.

PB80-812886 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
State-of-the-Art Reviews and Bibliographies on Energy. 1964-1978 (Citations from the NTIS Data Base).
Rept. for 1964-78,
Audrey S. Hundemann. Jul 80, 290p

Citations to bibliographies, state-of-the-art reviews, and literature surveys on various aspects of fossil fuels, wind, solar energy, hydrogen, geothermal energy, nuclear energy, and batteries are presented. A few citations pertain to electric power. (This updated bibliography contains 280 citations, none of which are new entries to the previous edition.)

PB80-812894 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
State-of-the-Art Reviews and Bibliographies on Energy. 1979-June, 1980 (Citations from the NTIS Data Base).
Rept. for 1979-Jun 80,
Audrey S. Hundemann. Jul 80, 117p
Supersedes NTIS/PS-79/0639 and NTIS/PS-78/0586.

Citations to bibliographies, state-of-the-art reviews, and literature surveys on various aspects of fossil fuels, wind, solar energy, hydrogen, geothermal energy, nuclear energy, and batteries are presented. A few citations pertain to electric power. (This updated bibliography contains 107 citations, 77 of which are new entries to the prevous edition.)

PB80-812910 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Energy Conservation: Industry. 1964-June, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-June, 1980,
Audrey S. Hundemann. Jul 80, 345p
Updates NTIS/PS-75/214 and COM-74-1138. Supersedes NTIS/PS-79/0648.

Potential methods of conserving energy, including fuel and materials substitutions, are considered for various industries. Many abstracts deal with reports that also cover processes used, amount of energy consumed, and environmental considerations of energy conserving options. Industries covered include food, paper, chemical, cement, metals, petroleum refining, contract construction, synthetic rubber, plastics, drug manufacturing, and stone, clay, and glass. Energy conservation through the use of waste heat is covered in a related Published Search entitled Waste Heat Utilization. (This updated bibliography contains 335 citations, 37 of which are new entries to the previous edition.)

SAND-80-0801C MF **A01**
EG and G, Inc., Albuquerque, NM.
Concentrating Solar Collector Test Results.
V. E. Dudley, and R. M. Workhoven. 1980, 5p
CONF-800604-5
Contract EY-76-C-04-0789
American section of the International Solar Energy Society conference, Phoenix, AZ, USA, 2 Jun 1980.
Microfiche copies only.

Some of the results obtained from three years of testing concentrating solar collectors at Sandia National Laboratories are summarized. Efficiency and thermal loss test data is shown for 16 collectors from 11 different manufacturers. (ERA citation 05:020437)

SERI/SP-401-516 PC **A10**/MF **A01**
Solar Energy Research Inst., Golden, CO.
National Solar Energy Education Directory. Second Edition.
G. Corcoleotes, S. Cronin, K. Kramer, and K. O'Connor. Jan 80, 206p

Contract EG-77-C-01-4042

The information contained in this directory is derived from responses to a national survey of educational institutions and organizations involved in solar energy educational activities beyond the secondary school level. Phone calls and follow-up mail requests were used to gather additional information when necessary. Every survey instrument was read, coded, and edited before entry into the data base from which this directory was produced. The Directory is organized alphabetically by state. Institutions and organizations within each state are categorized according to type (Colleges and Universities, Junior/Community Colleges, Vocational/Technical Schools, and Other Educational Institutions and Organizations) and listed alphabetically within these categories. Within each institutional listing the amount of information provided will vary according to the completeness of the survey response received from that institution. (ERA citation 05:020255)

SERI/TR-631-387 PC **A03**/MF **A01**
Solar Energy Research Inst., Golden, CO.
Analysis of the Omnium-G Receiver.
M. Bohn. Mar 80, 32p
Contract EG-77-C-01-4042

A thermal analysis of the Omnium-G receiver is presented and the technique is shown to be generally applicable to solar thermal receivers utilizing a directly heated thermal mass. The thermal loss coefficient, including reradiation losses, is calculated and shown to agree quite well with the experimentally measured thermal loss coefficient. The rate of heat transfer to the working fluid is also analyzed and the analysis is used to show that the Omnium-G receiver is well matched to the water/steam working fluid because the steam outlet temperature is almost the same as the receiver temperature. A general procedure for calculating receiver performance is presented. With this procedure, the energy delivery to any working fluid, the delivered temperature of the working fluid, and the pressure drop through the receiver can be determined. An example of the calculation is also presented. (ERA citation 05:022235)

UT/CES-PS-9 PC **A02**/MF **A01**
Texas Univ. at Dallas, Richardson. Center for Energy Studies.
Energy, Inflation, and Citizen Discontents: A Report on Public Reasoning About Electric Utility Policies and Nuclear Energy.
W. M. Denney, and J. S. Hendricks. Dec 79, 10p
Contract EX-77-S-01-6077

This is the second and final report of a year-long exploratory study of public opinion about energy and inflation problems in this country. Whereas the first project report (Hendricks and Denney 1979) dealt broadly with the nature of public reasoning about energy and inflation issues, this report focuses on narrower and somewhat more-concrete manifestations of these issues. The focus of this report is twofold: (1) public experiences and sentiments about the local electric utility; and (2) public reasoning about nuclear energy, including analysis of the impact of Three-Mile Island. Data for this report come mainly from telephone surveys of citizens of Austin, Texas. Austin is a prosperous, rapidly growing sunbelt city, with a municipally owned electric utility and a recent history of public controversy surrounding the utility, rising electric rates, and related municipal policies. The fact that Austin has unusually high electric rates, combined with a newly adopted peak seasonal rate structure which results in higher summer rates, makes it a forerunner for conditions that may soon be experienced by other cities in this country. Also, Austin voted on April 7, 1979, ten days after the Three-Mile Island accident, in favor (53% majority) of a bond proposition to raise $160 million to maintain the city's 16% share in the Mammoth South Texas Nuclear Project (STNP). 13 references, 20 tables, 3 figures. (ERA citation 05:018927)

10B. Power Sources

AD-A085 501/5 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Calculated and Measured Efficiencies of Thin-Film Shallow-Homojunction GaAs Solar Cells on Ge Substrates,
Journal article,
John C. C. Fan, Carl O. Bozler, and Barbara J. Palm. 7 May 79, 5p JA-4934, ESD-TR-79-358
Contract F19628-80-C-0002
Pub. in Applied Physics Letters, v35 n11 p875-878, 1 Dec 79.

No abstract available.

AD-A085 586/6 PC **A05**/MF **A01**
Air Force Wright Aeronautical Labs Wright-Patterson AFB OH
Operation of Generator Test Facility.
Final technical rept. Aug 79-Feb 80,
Philip G. Gaberdiel. Apr 80, 89p Rept no. AFWAL-TR-80-2033
Availability: Microfiche copies only.

This manual describes the operation of the Generator Test Facility of the Aero Propulsion Laboratory. This test facility is a computer-controlled facility for conducting performance tests of aircraft electrical generating systems. (Author)

AD-A085 601/3 PC **A05**/MF **A01**
Air Force Wright Aeronautical Labs Wright-Patterson AFB OH Aero-Propulsion Lab
A Review of Advanced Vehicular Diesel Research and Development Programs Which Have Potential Application to Stationary Diesel Power Plants.
Final rept. 1 Mar-1 Dec 79,
Andrew W. Kaupert. Mar 80, 82p AFWAL/PO-79-036, AFWAL-TR-80-2014

This report, prepared for the Aerospace Power Division, Aero Propulsion Laboratory, Wright-Patterson AFB, reviews, assesses, and summarizes the research and development status of advanced diesel engine/vehicular component technologies, and identifies those systems which may have application to diesel power plants utilized as stationary engine power sources. (Author)

AD-A085 786/2 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Efficient Shallow-Homojunction GaAs Solar Cells by Molecular Beam Epitaxy.
Journal article,
John C. C. Fan, Arthur R. Calawa, Ralph L. Chapman, and George W. Turner. 17 Aug 79, 4p JA-5023, ESD-TR-80-13
Contract F19628-80-C-0002
Pub. in Applied Physics Letters, v35 n10 p804-806, 15 Nov 79.

No abstract available.

BNL-27669 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Photovoltaic/Thermal Hybrid Projects.
E. A. Kush. 1980, 4p
Contract EY-76-C-02-0016

Systems which utilize a combination of photovoltaic and thermal collection in the same solar collectors (PV/T Systems) can have advantages over PV or thermal only systems in that the cost effectiveness of the collectors and their support structure may be improved, active cooling may allow the cells to run at lower temperatures-hence higher conversion efficiency, and space limitations on side by side collectors can be avoided. Evaluation of such systems requires formulation and assessment of collector concepts, power conditioning, storage, and control strategies, and their interactions when combined into a total system. Three projects to accomplish this are currently in progress. Two of them, at MIT/Lincoln Laboratory (MIT/LL) and Brown University address systems with flat plate PV/T collectors and vapor compression heat pump driven by the photovoltaic electric output. The third, at Arizona State University, is studying PV/T concentrating collectors and their potential applications, particularly to solar driven absorption chillers. (ERA citation 05:022017)

COO-2839-3(V.2) PC **A05**/MF **A01**
Foster Wheeler Development Corp., Livingston, NJ.
Conceptual Design of a Heat Pipe Solar Receiver Gas Turbine Plant. Final Report.
G. Carli. 15 Sep 78, 99p
Contract EY-76-C-02-2839

A conceptual design for a 10-MWe Heat Pipe Central Receiver Gas-Turbine Power Plant has been developed. The heat pipe central solar receiver uses heat pipes to transform the concentrated high solar heat flux at the receiver into a lower heat flux compatible with gas heat-transfer systems. Several Brayton cycles were studied to determine which cycles and operating conditions are technically and economically most viable for a central receiver power plant. A regenerative open-gas cycle with an inlet turbine temperature of 816 exp 0 C (1500 exp 0 F) was selected. The turbine-generator and receiver are located at the top of a steel tower, with a north field of 2-axis tracking heliostats. The system can be adapted for operation as a hybrid plant, providing a higher level of availability and a dependable generating capacity - important considerations from the utility point of view. The predicted cycle efficiency is 33 to 38%, and the overall solar-to-electric efficiency is 19.1 to 22.3%. Capital cost of the plant is estimated to be in the $1,947 to $2,002/kW range, depending on the assumed cost for the collector system. Compared with a water/steam solar system, estimated costs in mid-1978 dollars are lower and plant efficiency is superior. (ERA citation 05:022041)

COO-4577-10 PC **A02**/MF **A01**
Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
Solar Hybrid Energy Project.
M. C. Russell. 1980, 4p CONF-800340-5
Contract EG-77-S-02-4577
DOE active solar heating and cooling contractors' review meeting, Lake Tahoe, NV, USA, 26 Mar 1980.

Research at MIT Lincoln Laboratory on photovoltaic systems for residential buildings, combined photovoltaic/thermal systems for residential buildings, and heat pumps is briefly described. (ERA citation 05:022019)

DOE/ET/23007-2 PC **A03**/MF **A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg.
CdSiAs sub 2 Thin Films for Solar Cell Applications. Second Quarter Report, July 1, 1979-September 30, 1979.
L. C. Burton, and L. H. Slack. Oct 79, 31p
Contract AC04-79ET23007

Sputtered films have been formed with two improved composite (Si + CdAs sub 2) targets. Near stoichiometric and mechanically continuous CdSiAs sub 2 films have been formed on metal substrates. Films of this type will be used over the next reporting period for heterojunction formation. Evaporation studies related to CdAs sub 2 have been completed. Stoichiometric CdAs sub 2 films could not be formed by means of single-source evaporation of CdAs sub 2 bulk. Hence, this dual source approach (Si + CdAs sub 2) does not appear feasible with the techniques used thus far. Electron beam microprobe elemental analysis has been improved by changing from a GaAs standard to one of SiAs. The latter standard is more directly applicable to the compounds being measured. Accuracy of elemental composition measurements by means of the microprobe are estimated to be about +- 0.1 atomic percent. A CdS/CdSiAs sub 2 junction was formed on bulk CdSiAs sub 2 . This junction gives a good diode curve (no shunting or series resistance problems), although very poor photovoltaic response. Heterojunction formation and gridding procedure have been established. (ERA citation 05:021969)

DOE/ET/23013-T3 PC **A03**/MF **A01**
Pennsylvania State Univ., University Park. Materials Research Labs.
Controlled Cadmium Telluride Thin Films for Solar Cell Applications (Emerging Materials Systems for Solar Cell Applications). Quarterly Progress Report No. 3, October 9, 1979-January 8, 1980.
K. Vedam, M. B. Das, and S. V. Krishnaswamy. Feb 80, 31p
Contract AC04-79ET23013

The main emphasis during the third quarter of the program was on the improvement of the quality of sputtered films, their characterization and use in the fabrication of Schottky barrier type diodes and solar cell structures. Films prepared under different conditions and on different substrates were examined by SEM showing nodular growths under

certain conditions. I-V, C-V and photovoltaic characteristics were measured on numerous samples based on n- and p-type films on Ni substrates having top metallization of either evaporated Au and Al. The n-type samples showed up to 200mV V/sub oc/ and small short-circuit currents. The characteristics observed are indicative of the presence of interfacial layer and surface states. Surface state's capacitance were measured on p-type samples metallized with Au. (ERA citation 05:021972)

DOE/ET/23062-1 PC **A09**/MF **A01**
New Mexico Solar Energy Inst., Las Cruces.
20 Kilowatt Solar Photovoltaic Flat Panel Power System for an Uninterruptible Power Supply Load in El Paso, Texas. Phase 1. Final Report, October 1, 1978-March 31, 1979.
B. Blevins, R. Hsiao, A. Masud, H. Zwibel, and J. Brown. Feb 80, 191p
Contract AT04-78ET23062

The application is an uninterruptible power supply at Newman Power Station (located in El Paso, Texas) of El Paso Electric Company. Two parallel system design options are prescribed: a basic design and a back-up design. The overall difference between these two design options are minimum except that the basic design uses cadmium (CdS/Cu/sub x/S) modules while the back-up design uses single crystal silicon cell modules. Both designs use 9 module panels (in 3 x 3 matrix) made of redwood with no peak power tracker. The photovoltaic (PV) system dc output is used directly since the existing facility contains inverters and storage systems. The PV system design also includes system protection and control subsystem, and monitoring and instrumentation subsystem. Before the final designs were selected, multiple system alternatives were generated. Hourly system simulation for these alternatives were carried out on an annual basis and the alternatives were then ranked on the following three criteria: system reliability, levelized busbar energy cost, and operational and maintenance simplicity. The selected system designs were finally chosen by making subjective trade-offs between the three criteria. (ERA citation 05:022022)

DOE/ET/27017-T2 PC **A03**/MF **A01**
New Mexico Univ., Albuquerque.
Power Produced from Hot Dry Rock Geothermal Resources: A Case Study for the Imperial Valley, California.
R. G. Cummings, G. E. Morris, C. J. Arundale, and E. L. Erickson. Dec 79, 48p
Contract AS04-79ET27017

The case study described here concerns an HDR system which provides geothermal fluids for a hypothetical electric plant located in California's Imperial Valley. Primary concern is focused on the implications of differing drilling conditions, as reflected by costs, and differing risk environments for the potential commercialization of an HDR system. Drilling costs for best, medium and worst drilling conditions are taken from a recent study of drilling costs for HDR systems. Differing risk environments are presented by differing rate of return requirements on stocks and interest on bonds which the HDR system is assumed to pay; rate of return/interest combinations considered are 6%/3%, 9%/6%, 12%/9% and 15%/12%. The method used for analyzing the HDR system involves a two-stage process. In stage 1, the maximum amount that the electric plant can pay to an HDR system for geothermal fluids is calculated for alternative busbar prices of electricity received by the electric plant. In stage 2, costs for the HDR system are calculated under differing assumed risk environments and drilling conditions. These two sets of data may then be used to analyze the minimum busbar price of electricity - which defines a maximum fuel bill that could be paid to the HDR system by the electric plant - which could result in the HDR system's full recouperation of all production and drilling costs. (ERA citation 05:022260)

DOE/JPL/954355-79/4 PC **A03**/MF **A01**
Mobil Tyco Solar Energy Corp., Waltham, MA.
Large Area Silicon Sheet by EFG. Fourth Quarterly Report, October 1, 1979-December 31, 1979.
F. V. Wald. 1 May 80, 39p
Contract NAS-7-100-954355

In Machine No. 1, studies concerning the influence of gas ambients on the properties of the ribbon grown from resistance heated machines have continued. It has been demonstrated that material grown in a CO sub 2 -containing ambient can be processed so that cell efficiencies of approx. 12% (AM1) result. Machine 3B, the multiple furnace, is still in preparation for its first 10 cm ribbon multiple run. In Machine 17, full-width growth at 3 to 4 cm/min is now routine, and quality-related work will commence. (ERA citation 05:021973)

DOE/JPL/954356-2 PC **A04**/MF **A01**
Honeywell Corporate Material Sciences Center, Bloomington, MN.
Silicon-on Ceramic Process. Silicon Sheet Growth and Device Development for the Large-Area Silicon Sheet and Cell Development Tasks of the Low-Cost Solar Array Project. Quarterly Report No. 12, April 2, 1979-June 29, 1979.
P. W. Chapman, J. D. Zook, J. D. Heaps, B. L. Grung, and B. Koepke. 31 Jul 79, 66p
Contract NAS-7-100-954356

The objective of this research program is to investigate the technical and economic feasibility of producing solar-cell-quality sheet silicon. We plan to do this by coating one surface of carbonized ceramic substrates with a thin layer of large-grain polycrystalline silicon from the melt. During the quarter, significant progress was demonstrated in several areas: (1) a 10-cm exp 2 cell having 9.9 percent conversion efficiency (AM1, AR) was fabricated; (2) the Honeywall-sponsored SCIM coating development succeeded in producing a 225-cm exp 2 layer of sheet silicon (18 inches x 2 inches); and (3) 100 mu m-thick coatings at pull speed of 0.15 cm/sec wer$obta9ned, although apoproximately 50 percent of the layer exhibited dendritic growth. Other results and accomplishments during the quarter are reported in detail. (ERA citation 05:021974)

DOE/JPL/954786-79/7 PC **A11**/MF **A01**
Spire Corp., Bedford, MA.
Development of Pulsed Processes for the Manufacture of Solar Cells. Final Report.
J. A. Minnucci. Apr 79, 235p
Contract NAS-7-100-954786

The results of a one and half year program to develop the processes required for low-energy ion implantation for the automated production of silicon solar cells are described. The program included (1) demonstrating state-of-the-art ion implantation equipment and designing an automated ion implanter, (2) making efforts to improve the performance of ion-implanted solar cells to 16.5 percent AM1, (3) developing a model of the pulse annealing process used in solar cell production, and (4) preparing an economic analysis of the process costs of ion implantation and furnace annealing. During the program, phosphorus ions at an energy of 10 keV and dose of 2 x 10 exp 15 cm exp -2 were implanted in silicon solar cells to produce junctions, while boron ions at 25 keV and 5 x 10 exp 15 cm exp -2 were implanted in the cells to produce effective back surface fields. An ion implantation facility with a beam current up to 4 mA and a production throughput of 300 wafers per hour was designed and installed. A design was prepared for a 100-mA, automated implanter with a production capacity of 100 MW/sub e/ per year. Two process sequences were developed which employ ion implantation and furnace or pulse annealing. The JPL-Solar Array Manufacturing Industry Simulation (SAMIS) computer program was used to determine costs for junction formation by ion implantation and various furnace annealing cycles to demonstrate cost effectiveness of these methods. (ERA citation 05:021977)

DOE/JPL/954796-79/7 PC **A04**/MF **A01**
Moore School of Electrical Engineering, Philadelphia, PA.
Analysis and Evaluation in the Production Process and Equipment Area of the Low-Cost Solar Array Project.
H. Goldman, and M. Wolf. Aug 79, 62p
Contract NAS-7-100-954796

The energy consumed in manufacturing silicon solar cell modules was calculated for the current process, as well as for 1982 and 1986 projected processes. In addition, energy payback times for the above three sequences are shown. The module manufacturing energy was partitioned two ways. In one way, the silicon reduction, silicon purification, sheet formation, cell fabrication, and encapsulation energies were found. In addition, the facility, equipment, processing matrial, and direct material lost-in-process energies were appropriated in junction formation processes and full module manufacturing sequences. A brief methodology accounting for the energy of silicon wafers lost-in-processing during cell manufacturing is described. (ERA citation 05:021978)

DOE/JPL/954881-7 PC **A02**/MF **A01**
Texas Instruments, Inc., Dallas.
Automated Array Assembly, Phase 2. Quarterly Technical Progress Report, April-June 1979.
B. G. Carbajal. Jul 79, 19p
Contract NAS-7-100-954881

The Automated Array Assembly Task, Phase 2 of the Low Cost Solar Array (LSA) Project is a process development task. This contract provides for the fabrication of modules from large area Tandem Junction Cells (TJC). The key activities in this contract effort are (a) Large Area TJC including cell design, process verification and cell fabrication and (b) Tandem Junction Module (TJM) including definition of the cell-module interfaces, substrate fabrication, interconnect fabrication and module assembly. The overall goal is to advance solar cell module process technology to meet the 1986 goal of a production capability of 500 megawatts per year at a cost of less than $500 per peak kilowatt. This contract will focus on the Tandem Junction Module process. During this quarter, effort was focused on design and process verification. The large area TJC design was completed and the design verification was completed. Process variation experiments led to refinements in the baseline TJC process. Formed steel substrates were porcelainized. Cell array assembly techniques using infrared soldering are being checked out. Dummy cell arrays up to 5 cell by 5 cell have been assembled using all backside contacts. (ERA citation 05:021980)

DOE/JPL/954881-79-8 PC **A03**/MF **A01**
Texas Instruments, Inc., Dallas.
Automated Array Assembly, Phase 2. Final Technical Progress Report, 1979.
B. G. Carbajal. Nov 79, 40p
Contract NAS-7-100-954881

The 1979 phase of this Automated Array Assembly, Phase 2 contract was devoted solely to the tasks of scaling up the Tandem Junction Cell (TJC) from 2 cm x 2 cm to 6.2 cm x 6.2 cm and the assembly of several modules using these large-area TJCs. The scale-up of the TJC was based on using the existing process and doing the necessary design activities to increase the cell area to an acceptably large area. The design was carried out using available device models. The design was verified and sample large-area TJCs were fabricated. Mechanical and process problems occurred causing a schedule slippage that resulted in contract expiration before enough large-area TCs were fabricated to populate the sample Tandem Junction Modules (TJMs). A TJM design was carried out in which the module interconnects served to augment the current collecting buses on the cell. The module was made up of a 5 x 6 TJC matrix mounted on a porcelainized steel substrate with a glass cover. The TJC matrix was series-parallel connected using copper clad Invar interconnects soldered to the TJC metallization. Sample cell matrices were assembled using dummy cells. No sample TJMs were assembled due to a shortage of large-area TJCs and contract expiration. (ERA citation 05:021981)

DOE/JPL/954896-1 PC **A05**/MF **A01**
Tylan Corp., Torrance, CA.
Vitre-Graf Coating on Mullite. Low Cost Silican Solar Array Project: Large Area Silicon Sheet Task. Final Report, December 14, 1977-June 13, 1979.
R. C. Rossi. 1979, 83p
Contract NAS-7-100-954896

A technical and economic evaluation was made of a proprietary glass-like carbon glaze coating ap-

plied to mullite and graphite to be used either in thin-film silicon manufacture or in container ware applications. Preliminary evaluations had indicated that the glassy carbon coating reacts with molten silicon to form a silicon carbide reaction layer that may serve as a diffusion barrier to prevent silicon reaction with the substrate material. The technical evalution consisted of manufacturing test samples by varying materials and processing parameters in conformance with a pre-selected matrix. Various tests, primarily coating appearance, adherence and silicon reaction behavior was observed as a function of the test parameter variation. The results of these tests indicated that most graphite and carbonaceous materials used as substrates will produce a visually acceptable coating having excellent adherence over a wide range of processing parameters. However, no set of parameters produced a coating that could withstand the chemical attack from molten silicon and prevent reaction with a graphite substrate. The primary consideration of graphite substrates was in container ware applications requiring long-time molten silicon exposure. The conclusion of this study suggested that the glassy carbon coating might provide protection for time periods of 30 minutes or less, and therefore was not suitable for the intended application. The economic analysis generated a process based on the selected parameters for coating glassy carbon onto newly developed mullite substrate material. By using the interim standard price estimating equation a projected cost of $1.30/m exp 2 was calculated based on 1975 dollars. (ERA citation 05:021982)

DOE/JPL/954929-80/7 PC **A08**/MF **A01**
Clemson Univ., SC.
Investigation of Reliability Attributes and Accelerated Stress Factors of Terrestrial Solar Cells. Second Annual Report.
J. W. Lathrop, and J. L. Prince. Apr 80, 162p
Contract NAS-7-100-954929

The work covered in this report represents the second year's effort of a continuing program to determine the reliability attributes of terrestrial solar cells. Three main tasks were undertaken during the reporting period: (1) a study of the electrical behavior of cells in the second (reverse) quadrant, (2) the accelerated stress testing of three new state of the art cells and (3) the continued bias-temperature testing of four Block II type silicon cells at 78 exp 0 C and 135 exp 0 C. Electrical characteristics measured in the second quadrant were determined to be a function of the cell's thermal behavior with breakdown depending on the initiation of localized heating. This implied that high breakdown cells may be more fault tolerant when forced to operate in the second quadrant - a result contrary to conventional thinking. The accelerated stress tests used in the first (power) quadrant were bias-temperature, bias-temperature-humidity, temperature-humidity, thermal shock, and thermal cycle. The new type cells measured included an EFG cell, a polycrystalline cell, and a Czochralski cell. Electrical parameters measured included I/ sub SC/, V/sub OC/, P/sub M/, and I/sub M/. Incorporated in the report are the distributions of prestress electrical data for all cell types. Significant differences in the response to the various stress tests were observed between cell types. A microprocessed controlled, short interval solar cell tester was designed and construction initiated on a prototype for use in the program. (ERA citation 05:021984)

DOE/JPL/955265-79/2 PC **A03**/MF **A01**
Sensor Technology, Inc., Chatsworth, CA.
Automated Array Assembly Task Development of Low-Cost Polysilicon Solar Cells. Quarterly Technical Report No. 2.
K. L. Allison, G. T. Jones, S. S. Rhee, and S. R. Chitre. Dec 79, 40p
Contract NAS-7-100-955265

Three types of polysilicon materials were experimentally evaluated with Sensor Technology's standard production processing sequence during this reporting period. These materials include Wacker, Crystal Systems, and Exotic Materials polysilicon wafers. The average crystal grain size in the three polysilicon materials was obtained by statistically averaging the longest and shortest dimensions of each crystal grain in a set of random grain size measurements. An equation was derived to compute the fractional power loss associated with insufficient gridline coverage of polysilicon crystal grains. Two numerical examples are provided to illustrate the use of the fractional power loss equations in determining the suitability of the gridline spacing in a particular polysilicon grid pattern design. Other processes were explored for the purpose of improving the polysilicon solar cell efficiencies. Several metallization techniques were examined for suitability with a spray-on-dopant junction formation process sequence. A metallization problem was incurred in this program with cause and solution yet to be determined. (ERA citation 05:021986)

DOE/JPL/955382-79/4 PC **A03**/MF **A01**
Massachusetts Inst. of Tech., Cambridge.
Low-Cost Solar Array Project. Task I. Silicon Material: Investigation of the Hydrogenation of SiCl sub 4 . Fourth Quarterly Report.
J. Y. P. Mui, and D. Seyferth. 15 Apr 80, 39p
Contract NAS-7-100-955382

Reaction kinetic measurements on the hydrochlorination of SiCl sub 4 and m.g. silicon metal were last reported as a function of reaction temperature, reactor pressure and H sub 2 /SiCl sub 4 feed ratio. 3 SiCl sub 4 + S H sub 2 + Si reversible 4 SiHCl sub 3 . The same reaction has been studied in the presence of a copper catalyst. The presence of copper approximately doubles the reaction rates. A cement-type copper supplied by Union Carbide was evaluated at 5 wt % loading. After an induction period of about 22 hours, it began to show significant catalytic activity. Reaction kinetic measurements were then made as a function of reaction temperature (450 exp 0 , 500 exp 0 C), reactor pressure (300, 500 psig) and H sub 2 /SiCl sub 4 feed ratio (1.0 and 2.8). Another copper compound (CuCl) also was evaluated as a catalyst at 5 wt %. With CuCl, there was no induction period and full catalytic activity was observed soon after the reactor was brought to reaction conditions. Both cement copper and CuCl show about the same catalytic activity by doubling the reaction rate. Results of the copper studies provide some experimental evidence on the mechanism of the hydrochlorination reaction and on the nature of the copper catalyst. (ERA citation 05:021987)

DOE/NASA/0030-80/1 MF **A01**
United Technologies Corp., South Windsor, CT. Power Systems Div.
Cogeneration Technology Alternatives Study (CTAS) United Technologies Corporation Final Report. Volume I. Summary Report.
Jan 80, 126p NASA-CR-159759(V.1)
Contract EC-77-A-31-1062
Microfiche copies only.

The Cogeneration Technology Alternatives Study (CTAS) provides data and information in the area of advanced energy conversion systems for industrial cogeneration applications in the 1985 to 2000 time period. Six current and thirty-one advanced energy conversion systems were defined and combined with appropriate balance-of-plant equipment. Twenty-six industrial processes were selected from among the high energy consuming industries to serve as a frame work for the study. Each conversion system was analyzed as a cogenerator with each industrial plant. Fuel consumption, costs, and environmental intrusion were evaluated and compared to correspondending traditional values. Various cogeneration strategies were analyzed and both topping and bottoming (using industrial by-product heat) applications were included. The advanced energy conversion technologies indicated reduced fuel consumption, costs, and emissions. Typically fuel energy savings of 10 to 25% were pedicted compared to traditional on-site furnaces and utility electricity. With the variety of industrial requirements, each advanced technology had attractive applications. Overall, fuel calls indicated the greatest fuel energy savings and emission reductions. Gas turbines and combined cycles indicated high overall annual cost savings. Steam turbines and gas turbines produced high estimated returns. In some applications, diesels were most efficient. The advanced technologies used coal-derived fuels, or coal with advanced fluid bed combustion or on-site gasification systems. (ERA citation 05:022330)

DOE/NASA/0031-80/1 MF **A01**
General Electric Corporate Research and Development, Schenectady, NY.
Cogeneration Technology Alternatives Study (CTAS): General Electric Company Final Report. Volume I. Summary Report.
H. E. Gerlaugh, E. W. Hall, D. H. Brown, R. R. Priestley, and W. F. Knightly. Jan 80, 155p
NASA-CR-159765(V.1)
Contract EC-77-A-31-162
Microfiche copies only.

Large savings can be made in industry by cogenerating electric power and process heat in single energy conversion systems rather than separately in utility plants and in process boilers. This study examines the use of various advanced energy conversion systems and compares them with each other and with current technology systems for their savings in fuel energy, costs, and emissions in individual plants and on a national level. About fifty industrial processes from the largest energy consuming sectors were used as a basis for matching a similar number of energy conversion systems that are considered as candidate which can be made available by the 1985 to 2000 time period. The sectors considered included food, textiles, lumber, paper, chemicals, petroleum, glass, and primary metals. The energy converison systems included steam and gas turbines, diesels, thermionics, stirling, closed-cycle and steam injected gas turbines, and fuel cells. Fuels considered were coal, both coal and petroleum-based residual and distillate liquid fuels, and low Btu gas obtained through the on-site gasification of coal. An attempt was made to use consistent assumptions and a consistent set of groundrules specified by NASA for determining performance and cost. Atmospheric and pressurized fluidized bed steam turbine systems are the most attractive of the direct coal-fired systems. Open-cycle gas turbines with heat recovery steam generators and combined-cycles with NO/sub x/ emission reduction and moderately increased firing temperatures are the most attractive of the coal-derived liquid-fired systems. (ERA citation 05:022331)

EPRI-ER-1216 PC **A09**/MF **A01**
Beck (R.W.) and Associates, Denver, CO.
Heat Rejection from Geothermal Power Plants. Final Report.
R. D. Horsak. Nov 79, 181p

Comprehensive computer programs are developed for purposes of determining cooling makeup water requirements and electricity production costs for evaporative (wet) and dry/wet-peaking cooling towers, which are the principal cooling technologies for rejecting the heat from hydrothermal power plants. Parametric economic analyses were performed for both flash steam and binary conversion processes for various combinations of resource temperatures, climatological types, hydrothermal fuel costs, and cooling system makeup water costs. Results of these analyses are presented in a number of curves showing relative busbar cost of electricity as a function of relative amount of cooling makeup water required. These curves show that use of wet/dry cooling systems can cut makeup water requirements by factors of about 2 to 4 at the cost of an additional 10% to 25% in the busbar price of electricity. Turbine-generator performance curves are constructed for a range of condensing conditions for both the flash steam and hydrocarbon binary-cycle turbines. Estimates of hydrothermal resources in the western United States are also given. (ERA citation 05:022267)

EPRI-ER-1272 PC **A06**/MF **A01**
Stanford Univ., CA. Stanford Electronics Labs.
Silicon Photovoltaic Cells in TPV Conversion.
R. M. Swanson. Dec 79, 124p

An experimental and theoretical investigation of thermophotovoltaic (TPV) energy conversion using silicon photovoltaic cells has been performed. These cells are intended for use in a proposed solar-electric system that, in concept, uses concentrating mirrors focused on a TPV converter that operates at high power density and high efficiency. Within the TPV converter, the concentrated sunlight heats a refractory radiator. Photovoltaic cells face the radiator, receive incandescent radiation from it, and convert this radiation into electricity. A previously developed numerical model of TPV conversion and a TPV test facility were used to test TPV cells and correlate the results with theory. The

important cell parameters have been identified and investigated. The accuracy of the TPV model has been verified. Continued processing and TPV cell design development has taken the measured energy conversion efficiencies from 14 to 26 percent during the report period. Using parameters that are now thought reasonable, the TPV model predicts that mature TPV cells will have efficiencies around 43 percent. (ERA citation 05:021989)

EUR-6423EN MF **A01**
Commission of the European Communities, Ispra (Italy). Joint Research Centre.
Standard Procedures for Terrestrial Photovoltaic Performance Measurements: Specification No. 101.
1979, 44p
U.S. Sales Only. Microfiche copies only.

Since the response of a solar cell is wavelength-dependent, its performance is significantly affected by the spectral energy distribution of the radiation, which in the case of natural sunlight varies with location, weather, time of year and time of day. If the irradiance is measured with a thermopile-type radiometer, which is not spectrally selective, rated power measurements can vary by as much as 15% from day to day at the same place, due to changes in the spectral distribution. The procedures laid down in this Specification are designed to minimize such discrepancies by relating the performance rating to a standard terrestrial solar spectral energy distribution, hereafter referred to as standard sunlight. This is done by measuring irradiance with a reference solar cell or module which has been calibrated at 25 +- 2 exp 0 C in terms of short-circuit current per unit of standard sunlight irradiance (AW exp -1 m exp 2) by an approved Solar Cell Calibration Agency. The reference cell automatically takes account of variations in spectral distribution. If the performance of a cell, module or array is related to a known standard sunlight distribution, it is possible for a user or array designer, using the spectral response of the cells, to compute within a reasonable tolerance its performance in light or any other known spectral energy distribution. The procedures laid down in this Specification are also intended to minimize errors arising from faulty temperature measurement and voltage and current instrumentation. (ERA citation 05:021990)

JPL-PUB-79-107 PC **A06**/MF **A01**
Jet Propulsion Lab., Pasadena, CA.
Advanced Subsystems Development. Third Semiannual Progress Report, October 1, 1978-April 1, 1979.
15 Aug 79, 109p
Contract AI01-79ET20307

The results of the work performed by the Advanced Subsystems Development Task of the Advanced Solar Thermal Technology Project are summarized. Preliminary design for a prototype small (20 kWe) solar thermal electric generating unit was completed, consisting of several subsystems. The concentrator and the receiver collect solar energy and a thermal buffer storage with a transport system is used to provide a partially smoothed heat input to the Stirling engine. A fossil-fuel combustor is included in the receiver designs to permit operation with partial or no solar insolation (hybrid). The engine converts the heat input into mechanical action that powers a generator. To obtain electric power on a large scale, multiple solar modules will be required to operate in parallel. The small solar electric power plant used as a baseline design will provide electricity at remote sites and small communities. During this period the Advanced Subsystems Development Task moved out with contractors to implement development of a directly coupled solar receiver, a heat pipe solar receiver with thermal energy storage, kinematic Stirling engines, and advanced solar concentrator components. (ERA citation 05:022045)

N80-25360/2 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
The Solar Power Satellite Concepts: The past Decade and the Next Decade.
C. C. Kraft, Jr.. Jul 79, 22p NASA-TM-81000, JSC-14898
Presented at the 15TH Aiaa Ann. Meeting and Tech. Display, Washington, D.C., 6-8 Feb. 1979. Original Contains Color Illustrations.

Results of studies on the solar power satellite concept are summarized. The basic advantages are near continuous access to sunlight and freedom from atmospheric effects and cloud cover. The systems definition studies consider photovoltaic and thermal energy conversion systems and find both to be technically feasible, with the photovoltaic approach preferred. A microwave test program is under way which will provide quantitative data on critical parameters, including beam forming and steering accuracy. Ballistic and winged launch vehicles are defined for the transportation of construction materials, with the shuttle expected to provide low cost transportation to and from space. A reference system is outlined for evaluating the concept in terms of environmental and other considerations. Preliminary estimates of natural resource requirements and energy payback intervals are encouraging.

N80-25781/9 PC **A08**/MF **A01**
Clemson Univ., SC. Dept. of Electrical and Computer Engineering.
Investigation of Reliability Attributes and Accelerated Stress Factors on Terrestrial Solar Cells.
Annual Report.
J. W. Lathrop, and J. L. Prince. Apr 80, 168p
NASA-CR-163209, JPL-9950-338

Three tasks were undertaken to investigate reliability attributes of terrestrial solar cells: (1) a study of the electrical behavior of cells in the second (reverse) quadrant; (2) the accelerated stress testing of three new state-of-the-art cells; and (3) the continued bias-temperature testing of four block 2 type silicon cells at 78 C and 135 C. Electrical characteristics measured in the second quadrant were determined to be a function of the cell's thermal behavior with breakdown depending on the initiation of localized heating. This implied that high breakdown cells may be more fault tolerant when forced to operate in the second quadrant, a result contrary to conventional thinking. The accelerated stress tests used in the first (power) quadrant were bias-temperature, bias-temperature-humidity, temperature-humidity, thermal shock, and thermal cycle. The new type cells measured included an EFG cell, a polycrystalline cell, and a Czochralski cell. Significant differences in the response to the various tests were observed between cell types. A microprocessed controlled, short interval solar cell tester was designed and construction initiated on a prototype.

N80-25782/7 PC **A10**/MF **A01**
Pennsylvania Univ., Philadelphia. School of Electrical Engineering.
Analysis and Evaluation in the Production Process and Equipment Area of the Low-Cost Solar Array Project.
Annual Report, Oct. 1978 - Oct. 1979.
H. Goldman, and M. Wolf. Oct 79, 203p NASA-CR-163208, JPL-9950-342
Contract JPL-954796

Analyses of slicing processes and junction formation processes are presented. A simple method for evaluation of the relative economic merits of competing process options with respect to the cost of energy produced by the system is described. An energy consumption analysis was developed and applied to determine the energy consumption in the solar module fabrication process sequence, from the mining of the SiO2 to shipping. The analysis shows that, in current technology practice, inordinate energy use in the purification step, and large wastage of the invested energy through losses, particularly poor conversion in slicing, as well as inadequate yields throughout. The cell process energy expenditures already show a downward trend based on increased throughput rates. The large improvement, however, depends on the introduction of a more efficient purification process and of acceptable ribbon growing techniques.

N80-25783/5 PC **A02**/MF **A01**
Wyle Labs., Inc., Huntsville, AL. Solar Energy Systems Div.
Test Results on the Frenchman's Reef Solar Data Acquisition and Control System.
15 Jan 80, 19p NASA-CR-161449
Contract NAS8-32036
Sponsored in Part by DOE.

The Frenchman's Reef Data Acquisition and Control System (DACS), Sunlogger model 10000-1 was evaluated to determine the accuracy of control functions and the performance of the system in the environment of the planned installation site. The Sunlogger system was verified to perform normally in an environment of 100 F and approximately 90% humidity. It is recommended however that the Sunlogger be installed in a controlled environment with temperatures and humidity significantly lower than those referenced above.

N80-25785/0 PC **A04**/MF **A01**
Georgia Inst. of Tech., Atlanta. Engineering Extension Lab.
Photovoltaic System Costs Using Local Labor and Materials in Developing Countries.
E. Jacobson, G. Fletcher, and G. Hein. 20 May 80, 60p NASA-CR-163218
Grant NSG-3297

The use of photovoltaic (PV) technology in countries that do not presently have high technology industrial capacity was investigated. The relative cost of integrating indigenous labor (and manufacturing where available) into the balance of the system industry of seven countries (Egypt, Haiti, the Ivory Coast, Kenya, Mexico, Nepal, and the Phillipines) was determined. The results were then generalized to other countries, at most levels of development. The results of the study imply several conclusions: (1) the cost of installing and maintaining comparable photovoltaic systems in developing countries is less than in the United States; (2) skills and some materials are available in the seven subject countries that may be applied to constructing and maintaining PV systems; (3) there is an interest in foreign countries in photovoltaics; and (4) conversations with foreign nationals suggest that photovoltaics must be introduced in foreign markets as an appropriate technology with high technology components rather than as a high technology system.

N80-25789/2 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
Unfulfilled Technology Needs in Space Power Systems.
L. W. Slifer, Jr. Apr 80, 21p NASA-TM-80677
Proposed for Presentation at 15TH Intersoc. Energy Conversion Engr. Conf., Seattle, 18-22 Aug. 1980.

Major power system technology development needs related to the solution of currently existing problems are defined. The identified problems were initially listed and categorized by technical area. They were then translated into terms of technology development requirements and consolidated where commonality was found. From these requirements, a set of ten specific recommendations for technology development was formulated.

N80-25792/6 PC **A06**/MF **A01**
United Technologies Corp., South Windsor, CT. Power System Div.
Cogeneration Technology Alternatives Study. Volume 1: Summary Report.
Final Report.
Jan 80, 125p NASA-CR-159759, DOE/NASA/0030-80/1
Contracts DEN3-30, EC-77-A-31-1062

Data and information in the area of advanced energy conversion systems for industrial congeneration applications in the 1985-2000 time period was studied. Six current and thirty-one advanced energy conversion systems were defined and combined with appropriate balance-of-plant equipment. Twenty-six industrial processes were selected from among the high energy consuming industries to serve as a framework for the study. Each conversion system was analyzed as a cogenerator with each industrial plant. Fuel consumption, costs, and environmental intrusion were evaluated and compared to corresponding traditional values. Various cogeneration strategies were analyzed and both topping and bottoming (using industrial by-product heat) applications were included. The advanced energy conversion technologies indicated reduced fuel consumption, costs, and emissions. Typically fuel energy savings of 10 to 25 percent were predicted compared to traditional on-site furnaces and utility electricity. With the variety

of industrial requirements, each advanced technology had attractive applications. Overall, fuel cells indicated the greatest fuel energy savings and emission reductions. Gas turbines and combined cycles indicated high overall annual cost savings. Steam turbines and gas turbines produced high estimated returns. In some applications, diesels were most efficient. The advanced technologies used coal-derived fuels, or coal with advanced fluid bed combustion or on-site gasification systems.

N80-25793/4 PC **A99**/MF **A01**
United Technologies Corp., South Windsor, CT. Power Systems Div.
Cogeneration Technology Alternatives Study. Volume 2: Industrial Process Characteristics.
Final Report.
Jan 80, 697p NASA-CR-159760, DOE/NASA/0030-80/2
Contracts DEN3-30, EC-77-A-31-1062

Information and data for 26 industrial processes are presented. The following information is given for each process: (1) a description of the process including the annual energy consumption and product production and plant capacity; (2) the energy requirements of the process for each unit of production and the detailed data concerning electrical energy requirements and also hot water, steam, and direct fired thermal requirements; (3) anticipated trends affecting energy requirements with new process or production technologies; and (4) representative plant data including capacity and projected requirements through the year 2000.

N80-25794/2 PC **A13**/MF **A01**
United Technologies Corp., South Windsor, CT. Power Systems Div.
Cogeneration Technology Alternatives Study. Volume 4: Heat Sources, Balance of Plant and Auxiliary Systems.
Final Report.
Jan 80, 296p NASA-CR-159762, DOE/NASA/0030-80/4
Contracts DEN3-30, EC-77-A-31-1062

Data and information established for heat sources balance of plant items, thermal energy storage, and heat pumps are presented. Design case descriptions are given along with projected performance values. Capital cost estimates for representative cogeneration plants are also presented.

N80-25795/9 PC **A23**/MF **A01**
United Technologies Corp., South Windsor, CT. Power Systems Div.
Cogeneration Technology Alternatives Study. Volume 6: Computer Data.
Final Report.
Jan 80, 535p NASA-CR-159764, DOE/NASA/0030-80/6
Contracts DEN3-30, EC-77-A-31-1062

The potential technical capabilities of energy conversion systems in the 1985 - 2000 time period were defined with emphasis on systems using coal, coal-derived fuels or alternate fuels. Industrial process data developed for the large energy consuming industries serve as a framework for the cogeneration applications. Ground rules for the study were established and other necessary equipment (balance-of-plant) was defined. This combination of technical information, energy conversion system data ground rules, industrial process information and balance-of-plant characteristics was analyzed to evaluate energy consumption, capital and operating costs and emissions. Data in the form of computer printouts developed for 3000 energy conversion system-industrial process combinations are presented.

N80-26182/9 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
The Planar Multijunction Cell: A New Solar Cell for Earth and Space.
J. C. Evans, A. T. Chai, and C. Goradia. 1980, 8p NASA-TM-81526
Proposed for Presentation at 15TH Intern. Energy Conversion Engr. Conf., Seattle, Wash., 18-22 Aug. 1980; Sponsored by Aiaa, Presented at 14TH IEEE Photovoltaic Specialists Conf., San Diego, Calif., 7-10 Jan. 1980.

A family of high-voltage solar cells, called the planar multijunction (PMJ) cell is being developed. The new cells combine the attractive features of planar cells with conventional or interdigitated back contacts and the vertical multijunction solar cell. The PMJ solar cell is internally divided into many voltage-generating regions, called unit cells, which are internally connected in series. The key to obtaining reasonable performance from this device was the separation of top surface field regions over each active unit cell area. Using existing solar cell fabricating methods, output voltages in excess of 20 volts per linear centimeter are possible. Analysis of the new device is complex, and numerous geometries are being studied which should provide substantial benefits in both normal sunlight usage as well as with concentrators.

PB80-192131 PC **A04**/MF **A01**
California Energy Commission, Sacramento.
Preliminary Evaluation of the Industrial Cogeneration Potential in Five San Francisco Bay Area Counties.
Consultant rept.,
Carl Martineau, Jr., and Robert M. Rodden. Jun 80, 61p CAEC-55, CAEC-500-80-026

The study develops estimates of the industrial cogeneration potential in five San Francisco Bay Area counties: Alameda, Contra Costa, Santa Clara, San Mateo and San Francisco. The general approach was to develop the estimates using survey techniques including mailed questionnaires and on-site visits.

PB80-192149 PC **A04**/MF **A01**
California Energy Commission, Sacramento.
Municipal Waste Water as a Source of Cooling Water for California Electric Power Plants.
Final rept.,
Tom MacDonald. May 80, 62p CAEC-52, CAEC-300-80-021

This report discusses sources of municipal waste water for potential use as cooling water in California power plants. It notes the major factors which affect this practice. Municipal treatment facilities in California with discharge volumes deemed adequate to supply new power plants are identified. Also included is a summary of the experiences of several utilities in California and other western states with existing or planned applications of municipal waste water in power plant cooling towers.

PB80-193584 PC **A03**/MF **A01**
Montgomery (Hugh), Santa Monica, CA.
Bottoming Cycle Cogeneration: Prospects and Problems.
Consultant rept. (Final),
Hugh Montgomery. May 80, 48p CAEC-54, CAEC-500-80-026

The study was undertaken to determine the potential for, and identify the problems standing in the way of, wider application of bottoming cycle cogeneration. There is significant potential for use of bottoming cycle cogeneration in California industry, since tens of billions of Btus/hr are being exhausted to the atmosphere in the form of waste heat with temperatures in excess of 700F, much of it at substantially higher temperatures. If all of this exhaust heat were used to generate electricity, the amount could be in the order of 1,000 MW.

PB80-197247 PC **A04**/MF **A01**
California Energy Commission, Sacramento.
Issues Related to the Reliability of Power Plants in California.
Staff paper (Final),
L. A. Shurley. Dec 79, 68p CAEC-68, CAEC-700-79-016

The paper reflects the concern that without reexamination on the part of the industry of its past policies, traditions and practices, the power plants yet to be licensed in the State of California may not fulfill their full productivity potential. Also, this document seeks a recognition of all parties participating in the regulatory processes, that unless appropriate and deliberate measures are applied, the reliability of the future power generating facilities may be inconsistent with the energy needs, and consequently the reliability deficiency may have to be compensated for by construction of additional generating units that otherwise should not be required. Accordingly, the causes and factors contributing to degradation of power plants reliability are identified, and various means of reduction (or elimination) of such causes, along with related economic aspects are discussed. Basic policies derived from the statutory requirements, the ensuing Commission's role, and the role of the Commission's staff relative to the reliability issues are identified. The contents of this document are applicable to any type of baseload power generating facility. The provided record, pointing to the need for reliability improvement covers the history of nuclear, geothermal, coal, gas, and oil-fired units.

PB80-809080 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Inverter Converters. 1970-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1970-Apr 80,
Robert Hippler. May 80, 106p
Sponsored in part by National Technical Information Service, Springfield, VA.

Cited works cover the field of electrical devices which convert direct to alternating current. Some of the applications discussed are motor and furnace drives, solar and wind generated electrical power conversion, variable-frequency devices for motor speed-control drives, and power frequency conversion devices. The components used in these devices, such as thyristors, SCRs, MOS devices, etc., and the associated circuitries, are described. (Contains 91 citations)

PNL-3234 PC **A05**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Quarterly Progress Report on the Evaluation of Critical Materials for Photovoltaic Cells.
R. L. Watts, W. W. Pawlewicz, W. E. Gurwell, W. M. Jamieson, and L. W. Long. Sep 79, 79p
Contract EY-76-C-06-1830

The scope of the activities included in this program are as follows: (1) characterize new and improved photovoltaic cell designs and production processes for subsequent analysis; (2) review or screen these designs for potential material shortages or other constraints; (3) carry out investigations of the probable costs of new sources of materials potentially in short supply, concentrating on gallium and indium; and (4) identify options for coping with or mitigating the problems identified. The methodology and data base used in the CMAP (Critical Material Analysis Program) computer program were developed as part of a broad scale DOE program to review the potential material constraints of all solar programs. The photovoltaic report screened 13 cells in 15 systems and assumed 100% material utilization (process efficiency) in producing the photovoltaic cells. This study emphasizes the availability of cell fabrication feedstock materials and the effects of process efficiencies on material availability by adding characterizations of photovoltaic production processes. This quarterly report presents the results of work with emphasis on Task I, the characterization of photovoltaic cells and their production processes. Task IIA, CMAP Modification, Data Base Development and Operation has been initiated. Task IIB, Review, Integration, Interpretation and Analysis of Screening will begin once the baseline screening has been completed in Task IIA. Work on Task IIIA, the Assessment of Future Costs and Supplies of Gallium and Indium and Task IIIB, Economics of Coal Derived PV Materials have been initiated. Progress and initial results are reported. (ERA citation 05:021995)

SAND-79-2331 PC **A04**/MF **A01**
Sandia Labs., Albuquerque, NM.
Parametric Analysis of Residential Grid-Connected Photovoltaic Systems with Storage.
D. L. Caskey, B. C. Caskey, and E. A. Aronson. Mar 80, 73p
Contract EY-76-C-04-0789

The Sandia Laboratories' optimizing computer code, SOLSTOR, has been used to investigate the role of battery storage in a residential photovoltaic system. The system is connected to the utility grid, and Time-of-Day (TOD) pricing and sell-back policies are considered. Several parameters, including geographic location, were varied, resulting in a large number of systems optimized with respect to the 20-year life cycle cost of providing energy for an all-electric home. Conclusions are that battery

costs of around $100/kWh or less are required for storage to be economically beneficial, when combined with TOD ratios of 3:1 or more, or sell-back ratios of 0.5 or less. (ERA citation 05:022029)

SAND-80-8179 PC **A03**/MF **A01**
Martin Marietta Corp., Denver, CO.
Molten Salt Safety Study. Final Report.
Jan 80, 30p MCR-80-1305
Contract EY-76-C-04-0789

The considerations concerning safety in using molten salt (40% potassium nitrate, 60% sodium nitrate) in a solar central receiver plant are addressed. The considerations are of a general nature and do not cover any details of equipment or plant operation. The study includes salt chemical reaction, experiments with molten salt, dry storage and handling constraints, and includes data from the National Fire Protection Association. The contents of this report were evaluated by two utility companies and they concluded that no major safety problems exist in using a molten salt solar system. (ERA citation 05:022043)

UCID-18592 PC **A08**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Reactively Sputtered Thin Film Cu/sub X/S/ CdS Photovoltaic Devices. Final Progress Report, October 1, 1978-September 30, 1979.
L. D. Partain, G. A. Armantrout, J. H. Yee, J. Y. Leong, and D. Okubo. 2 Apr 80, 161p
Contract W-7405-ENG-48

An overview of the major results achieved is given. It is shown that the gross I-V properties not explained by standard theory is well modeled by space-charge-limited current (SCL I) analysis. Extension of the SEM EBIC techniques coupled with the unique material fabrications obtained with sputtering have allowed rather complete characterizations of thin film devices for the first time. These measurements included the minority and majority carrier transport parameters and the optical properties and indicated that unanticipated parameters determine performance and control repeatability and should establish device stability limits. The junction region losses of minority carrier current are identified as a dominant effect of heat treatment and actual junction collection efficiency values are quantified using a new analysis technique. Sputtering provided unique advantages that allowed free standing, polycrystalline Cu/sub x/S films to be formed on glass for clear determinations of charge transport and optical properties in addition to providing a highly planar geometry on the CdS substrates required for the SEM studies. The benefits of sputtered device fabrication is assessed. Following this overview, more extensive discussions of the individual efforts are contained in the reprints and preprints of six technicle articles included. (ERA citation 05:022000)

10C. Energy Storage

AD-A085 661/7 PC **A04**/MF **A01**
Duracell International Inc Burlington MA Lab for Physical Science
Lithium-Thionyl Chloride Battery.
Quarterly rept. no. 5, 1 Nov 79-31 Jan 80,
A. N. Dey, N. Hamilton, W. Bowden, P. Witalis, and D. Cubbison. Jun 80, 61p DELET-TR-78-0563-5
Contract DAAB07-78-C-0563

The Li/SOCl2 inorganic electrolyte system is the highest energy density system known to data. It consists of a Li anode, a carbon cathode and SOCl2, which acts both as a solvent and cathode active material. The electrolyte salt that has been used most extensively is LiAlCl4, but salts such as Li2B10Cl10 and Li2O(AlCl3)2 have also been used successfully in this system for improving the shelf life characteristics. The main objective of this program is to develop high rate Li/SOCl2 cells and batteries for portable applications of the U.S. Army. The cells and batteries must deliver higher energy densities than are presently available and must be safe to handle under field conditions.

AD-A085 669/0 MF **A01**
Eagle-Picher Industries Inc Joplin MO Couples Dept
Cadmium Electrode Investigation.
Final rept. 16 Jul-4 Dec 79,
Erwin Buck. Mar 80, 12p AFWAL-TR-80-2008
Contract F33615-79-C-2056
Availability: Microfiche copies only.

Methods for improving the loading and utilization of active material in electrochemically impregnated cadmium electrodes were studied using sweep voltametry and galvanostatic pulse impregnation. Loading levels and utilization were found to decrease with cycling when the potentiostatic pulse method was used and impregnation times beyond one hour resulted in unacceptable surface loading. The use of galvanostatic pulse impregnation appeared to offer greater promise; however, solution composition, temperature and the pulse regime remain to be optimized. Several areas are recommended for further study including understanding of the cathodic processes, the economics of the counter electrode, solution pH control, definition of the process parameters and the effect of plaque pore morphology on loading efficiency. (Author)

ANL-79-15(Ed.2) PC **A17**/MF **A01**
Argonne National Lab., IL.
Design and Installation Manual for Thermal Energy Storage.
R. L. Cole, K. J. Nield, R. R. Rohde, and R. M. Wolosewicz. Jan 80, 381p
Contract W-31-109-ENG-38

The purpose of this manual is to provide information on the design and installation of thermal energy storage in active solar systems. It is intended for contractors, installers, solar system designers, engineers, architects, and manufacturers who intend to enter the solar energy business. The reader should have general knowledge of how solar heating and cooling systems operate and knowledge of construction methods and building codes. Knowledge of solar analysis methods such as f-Chart, SOLCOST, DOE-1, or TRNSYS would be helpful. The information contained in the manual includes sizing storage, choosing a location for the storage device, and insulation requirements. Both air-based and liquid-based systems are covered with topics on designing rock beds, tank types, pump and fan selection, installation, costs, and operation and maintenance. Topics relevant to latent heat storage include properties of phase-change materials, sizing the storage unit, insulating the storage unit, available systems, and cost. Topics relevant to heating domestic water include safety, single- and dual-tank systems, domestic water heating with air- and liquid-based space heating systems, and stand alone domestics hot water systems. Several appendices present common problems with storage systems and their solutions, heat transfer fluid properties, economic insulation thickness, heat exchanger sizing, and sample specifications for heat exchangers, wooden rock bins, steel tanks, concrete tanks, and fiberglass-reinforced plastic tanks. (ERA citation 05:018778)

GEPP-OP-486 PC **A02**/MF **A01**
General Electric Co., St. Petersburg, FL.
New Processing Technique for DEB Powder for Thermal Batteries.
R. Szwarc, and R. D. Walton. Jun 80, 8p CONF-800612-4
Contract EY-76-C-04-0656
29. power sources conference, Atlantic City, NJ, USA, 9 Jun 1960.

The purpose of this paper is to explore how material processing influences thermal battery performance, and how battery performance can be improved by changes in processing. This discussion is confined to the class of thermal batteries designed by Sandia Laboratories and built under the supervision of General Electric in St. Petersburg, Florida. The electrochemical system employed is: Ca/LiCl-KCl-CaCrO sub 4 /Fe. These batteries are primary reserve batteries which employ a pelletized cell design. Each cell consists of an electrolyte-depolarizer pellet sandwiched between an anode and a heat pellet. The anode employed may be one of two forms: sheet calcium disc, mechanically attached to an iron or steel backing; or a substrate disc of iron or steel on which 3 to 5 mils of calcium had been evaporated. The depolarizer-electrolyte, commonly referred to as DEB, is composed of CaCrO sub 4 , LiCl-KCl eutectic and SiO sub 2 binder powder, which has been blended and pressed into pellets. The DEB pellet serves as electrolyte and as active cathode when the salt becomes molten upon battery activation. The heat pellet serves the dual purpose of providing the heat necessary to activate the battery and as the cathode current collector. The heat pellet is composed of iron powder and KClO sub 4 . A battery is made up of one or more stacks of about 12 cells connected in series to produce a voltage of 28 to 32 volts. Since activated life requirements for batteries vary from seconds up to one hour, the battery must be well insulated to conserve the heat produced by the ignition of the heat pellets to maintain the electrolyte in a molten state. This insulation is also important to protect sensitive electronic components in contact with the battery case. Because the electrolyte, particularly LiCl, is hygroscopic, the batteries are hermetically sealed in stainless steel cans, and are manufactured in dryrooms maintained at 3% relative humidity or better. (ERA citation 05:022481)

N80-25779/3 PC **A05**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Thermal Energy Storage.
Jun 80, 77p NASA-TM-81514, E-457
Contract EC-77-A-31-1034

The planning and implementation of activities associated with lead center management role and the technical accomplishments pertaining to high temperature thermal energy storage subsystems are described. Major elements reported are: (1) program definition and assessment; (2) research and technology development; (3) industrial storage applications; (4) solar thermal power storage applications; and (5) building heating and cooling applications.

N80-25780/1 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Pulse Charging of Lead-Acid Traction Cells.
J. J. Smithrick. May 80, 22p NASA-TM-81513, DOE/NASA/1044-6
Contract EC-77-A-31-1044

Pulse charging, as a method of rapidly and efficiently charging 300 amp-hour lead-acid traction cells for an electric vehicle application was investigated. A wide range of charge pulse current square waveforms were investigated and the results were compared to constant current charging at the time averaged pulse current values. Representative pulse current waveforms were: (1) positive waveform-peak charge pulse current of 300 amperes (amps), discharge pulse-current of zero amps, and a duty cycle of about 50%; (2) Romanov waveform-peak charge pulse current of 300 amps, peak discharge pulse current of 15 amps, and a duty of 50%; and (3) McCulloch waveform peak charge pulse current of 193 amps, peak discharge pulse current of about 575 amps, and a duty cycle of 94%. Experimental results indicate that on the basis of amp-hour efficiency, pulse charging offered no significant advantage as a method of rapidly charging 300 amp-hour lead-acid traction cells when compared to constant current charging at the time average pulse current value. There were, however, some disadvantages of pulse charging in particular a decrease in charge amp-hour and energy efficiencies and an increase in cell electrolyte temperature. The constant current charge method resulted in the best energy efficiency with no significant sacrifice of charge time or amp-hour output. Whether or not pulse charging offers an advantage over constant current charging with regard to the cell charge/discharge cycle life is unknown at this time.

N80-26211/6 PC **A02**/MF **A01**
Fiat Research Center, Turin (Italy).
Electrochemical Energy Storage on Board of Road Electric Vehicles.
P. Montalenti, G. Brusaglino, M. Marchetto, and M. Maja. 1979, 11p
Presented at Intern. Assembly on Energy Storage, Dubrovnik, Yugoslavia, 27 May - 1 Jun. 1979.

The use of batteries to power electric vehicles is evaluated in terms of accelerations and maximum speed. A kaline, lead/acid, and high energy density batteries are analyzed for lifetime cycles, weight

range, and power density. It is concluded that the lead/acid and Ni/Cd batteries are suitable for immediate application, but improvement in lifetime and reliability for economy is recommended. Future configurations of the Ni/Fe and Ni/Zn batteries will open the market to urban, suburban and commercial transportation.

PAT-APPL-6-009 622 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
System and Method for Charging Electrochemical Cells in Series.
Patent Application,
W. H. DeLuca, F. Hornstra, Jr., G. H. Gelb, B. Berman, and L. W. Moede. Filed 6 Feb 79, 20p
Contracts W-31-109-ENG-38, W-31-109-38-397
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A battery charging system capable of equalizing the charge given each individual cell at a selected full charge voltage includes means for regulating charger current to increase current at a constant rate until a bulk charging level is achieved or until any cell reaches a safe reference voltage. A system controller then begins to decrease the charging rate as long as any cell exceeds the reference voltage until an equalization current level is reached. At this point, the system controller activates a plurality of shunt modules to permit shunting of current around any cell having a voltage exceeding the reference voltage. Leads extending between the battery of cells and shunt modules are time shared to permit alternate shunting of current and voltage monitoring without the voltage drop caused by the shunt current. After each cell has at one time exceeded the reference voltage, the charging current is terminated. (ERA citation 05:024154)

PATENT-4 192 908
Not available NTIS
Department of the Navy Washington DC
Mass-Transport Separator for Alkaline Nickel-Zinc Cells and Cell.
Patent,
Albert Himy, and Otto C. Wagner. Filed 15 Jun 79, patented 11 Mar 80, 12p AD-D007 270/2, PAT-APPL-6-048 878
Supersedes PAT-APPL-6-048 878, AD-D006 910.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A mass-transport separator for use in alkaline nickel-zinc cells which comprises a barrier layer of a microporous membrane which contains a laminate of a material having a hydrogen overpotential in alkaline solution which is lower than that of zinc, the barrier layer being sandwiched between two protective layers of microporous polyolifin material. (Author)

PATENT-4 198 474
Not available NTIS
Department of the Navy Washington DC
Seawater Battery.
Patent,
Pinakin M. Shah. Filed 26 Feb 79, patented 15 Apr 80, 7p AD-D007 242/1, PAT-APPL-6-015 092
Supersedes PAT-APPL-6-015 092, AD-D006 160.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

This patent describes a high energy multicell seawater activated battery with provision for uniformly distributing a desired concentration of the electrolyte for maximum power output. When the battery is submerged to a predetermined depth, seawater is admitted into a mixing chamber where it flows through a plurality of intercommunicating compartments each containing an electrolyte of pelletized potassium hydroxide (KOH) which dilutes to form an ionized solution. The solution flows into a plurality of evacuated cells to establish an ionic flow from a nickel oxide hydroxide (NiOOH) cathode to a zinc (Zn) anode in each cell. An outlet valve in each cell releases the solution to reduce the internal cell pressure when the external pressure decreases as when the battery is retrieved. The quantity of pelletized electrolyte, seawater flow rate, and turbulence within the chamber are predetermined to insure uniform distribution of electrolyte in solution at a desired concentration. The improved electrolyte mixing thereby results in a battery of relatively high power output per unit of volume. (Author)

PB80-808629 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Battery Electrolytes. 1972-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1972-Apr 80,
C. Gilbert Young. May 80, 215p
Sponsored in part by National Technical Information Service, Springfield, VA.

Many types of solid, liquid and gaseous battery electrolytes are described and analyzed in the cited abstracts. Battery design, construction, and use, employing the listed electrolytes, are discussed. Battery life, efficiency, and maintenance characteristics are also delineated. (Contains 196 citations)

PB80-808637 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Battery Electrolytes. 1970-April, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1970-Apr 80,
C. Gilbert Young. May 80, 37p
Sponsored in part by National Technical Information Service, Springfield, VA.

Many types of solid, liquid and gaseous battery electrolytes are described and analyzed in the cited abstracts. Battery design, construction, and use, employing the listed electrolytes, are discussed. Battery life, efficiency, and maintenance characteristics are also delineated. (Contains 29 citations)

SAND-79-2148C MF **A01**
Sandia Labs., Albuquerque, NM.
Performance Data for a Lithium-Silicon/Iron Disulfide, Long-Life, Primary Thermal Battery.
R. K. Quinn, A. R. Baldwin, and J. R. Armijo.
1980, 17p CONF-800612-3
Contract EY-76-C-04-0789
29. power sources conference, Atlantic City, NJ, USA, 9 Jun 1980.
Microfiche copies only.

Sandia National Laboratories has recently been involved in the development of a 60-minute, 28 volt, primary thermal battery with a volume of 400 cm exp 3 . The feasibility of Li(Si)/LiCl.KCl/FeS sub 2 battery was previously demonstrated at a current of 0.5 A. In this paper, the effects of various environmental tests on battery performance are reported. In order to simulate possible nuclear ordnance environments, batteries have been subjected to shock, rhythmic and random vibration, and longitudinal and lateral acceleration in the unactivated and activated state. The level and duration of these tests varied, but the performance remained good. The effects of variation in current density from open circuit to 1 A/cm exp 2 , as well as various pulse loads, have been examined. Also presented are results of stabilizing the batteries at temperatures in the range of -54 exp 0 C to +70 exp 0 C as reflected in various performance parameters. The Li(Si)/LiCl.KCl/FeS sub 2 electrochemical system has also been applied to two new Sandia-designed batteries requiring rugged, medium-life performance, i.e., activated lives of 2.5 and 4 minutes. Encouraging initial results of this application are included here. (ERA citation 05:022479)

11. MATERIALS

11A. Adhesives and Seals

PAT-APPL-6-145 209 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Fully Plasma-Sprayed Compliant Backed Ceramic Turbine Seal.
Patent Application,
R. C. Bill. Filed 30 Apr 80, 7p N80-24619/2, NASA-CASE-LEW-13268-1
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

To maintain the minimum operating clearances between the blade tips and the lining of a high pressure turbine, a low temperature easily decomposable material, such as a polymer, in powder form is blended with a high temperature oxidation resistant metal powder. The two materials are simultaneously deposited on a substrate formed by the turbine casing. Alternately, the polymer powder may be added to the metal powder during plasma spraying. A ceramic layer is then deposited directly onto the metal-polymer composite. The polymer additive mixed with the metal is then completely volatilized to provide a porous layer between the ceramic layer and the substrate. Thermal stresses are reduced by virtue of the resulting porous structure which affords a cushion effect. By using plasma spraying for depositing both the powders of the metal and polymer material, as well as the ceramic powder, no brazing is required.

11B. Ceramics, Refractories, and Glasses

AD-A085 547/8 PC **A02**/MF **A01**
Army Materials and Mechanics Research Center Watertown MA
A Simple Model for Aluminum Oxynitride Spinels,
James W. McCauley. 28 Sep 77, 11p Rept no. AMMRC-TR-80-21
Pub. in Jnl. of the American Ceramic Society, v61 n7-8 p372-373 Jul-Aug 78. Presented at the Fall Meeting of the Basic Science and Nuclear Divisions, the American Ceramic Society, Hyannis, MA, 26 Sep 77.

No abstract available.

COO-1591-34 PC **A02**/MF **A01**
Utah Univ., Salt Lake City. Div. of Materials Science and Engineering.
Impurity Effects on the Creep of Polycrystalline Magnesium and Aluminum Oxides at Elevated Temperatures. Technical Progress Report, December 19, 1978-December 18, 1979.
R. S. Gordon. Dec 79, 20p
Contract EY-76-S-02-1591

Research is described on: the effect of mixed transition metal impurities (Fe-Ti, Mn-Ti, and Mg-Ti) on the steady state creep of polycrystalline aluminum oxide, stress relaxation deformation studies on polycrystalline MgO and Al sub 2 O sub 3 , pure and doped with iron, and the theoretical analysis of ambipolar diffusion taking into account interfacial defect creation and/or annihilation processes at grain boundaries, and impurity effects, particularly those with mixed dopants, on the diffusional creep of polycrystallina alumina can be completely explained provided Schottky defects are assumed to be the intrinsic defects in Al sub 2 O sub 3 . (ERA citation 05:022716)

FRNC-TH-766 PC **A05**/MF **A01**
Grenoble-1 Univ. (France).
Boron Nitride Elastic and Thermal Properties. Irradiation Effects.
B. Jager. 1977, 92p
In French.Thesis.
U.S. Sales Only.

The anisotropy of boron nitride (BN) and especially thermal and elastic properties were studied. Specific heat and thermal conductivity between 1.2 and 300 exp 0 K, thermal conductivity between 4 and 350 exp 0 K and elastic constants C sub 33 and C sub 44 were measured. BN was irradiated with electrons at 77 exp 0 K and with neutrons at 27 exp 0 K to determine properties after irradiation. (Atomindex citation 11:499267)

PAT-APPL-6-001 033 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Improved Structural Silicon Nitride Materials Containing Rare Earth Oxides.
Patent Application,

C. A. Anderson. Filed 4 Jan 79, 17p
Contract E(40-1)-5210
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A ceramic composition suitable for use as a high-temperature structural material in apparatus exposed to oxidizing atmospheres at temperatures of 400 to 1600 exp 0 C is described. It is found within the triangular area ABCA of the Si sub 3 N sub 4 - SiO sub 2 -M sub 2 O sub 3 ternary diagram. M is selected from the group of Yb, Dy, Er, Sc, and alloys having Yb, Y, Er, or Dy as one component and Sc, Al, Cr, Ti, (Mg + Zr) or (Ni + Zr) as a second component. The alloy has an effective ionic radius less than 0.89 A. (ERA citation 05:024433)

PAT-APPL-6-037 247 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Method of Forming Single Crystals of beta Silicon Carbide.
Patent Application,
L. B. Lundberg. Filed 9 May 79, 8p
Contract W-7405-ENG-36
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method of growing single crystals of beta SiC from solution using molten lithium as a solvent for polycrystalline SiC feed material. Reasonable growth rates are accomplished at temperatures in the range of about 1330 exp 0 C or about 1500 exp 0 C. (ERA citation 05:024426)

PAT-APPL-6-040 810 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Chemical Vapor Deposition of Sialon.
Patent Application,
R. L. Landingham, and A. W. Casey. Filed 21 May 79, 8p
Contract W-7405-ENG-48
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A laminated composite and a method for forming the composite by chemical vapor deposition are described. The composite includes a layer of sialon and a material to which the layer is bonded. The method includes the steps of exposing a surface of the material to an ammonia containing atmosphere; heating the surface to at least about 1200 exp 0 C; and impinging a gas containing N sub 2 , SiCl sub 4 , and AlCl sub 3 on the surface. (ERA citation 05:024425)

PAT-APPL-6-047 597 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Silicon-Nitride and Metal Composite.
Patent Application,
R. L. Landingham, and S. A. Huffamith. Filed 11 Jun 79, 8p
Contract W-7405-ENG-48
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A composite and a method for bonding the composite are described. The composite includes a ceramic portion of silicon nitride, a refractory metal portion and a layer of MoSi sub 2 indirectly bonding the composite together. The method includes contacting the layer of MoSi sub 2 with a surface of the silicon nitride and with a surface of the metal; heating the layer to a temperature below 1400 exp 0 C; and, simultaneously, compressing the layer such that the contacting is with a pressure of at least 30 MPa. This composite overcomes useful life problems in the fabrication of parts for a helical expander for use in power generation. (ERA citation 05:024427)

PB80-192214 PC **A04**/MF **A01**
New York State Coll. of Ceramics, Alfred.
Possible Uses of Manganese Dioxide in Ceramic Applications. Literature Review and Analysis.
Research rept. 2 Aug 79-1 Jan 80,
David R. Rossington. 11 Feb 80, 71p BUMINES-OFR-68-80
Contract J0199130

The report presents a literature review of current uses of MnO2 and suggestions for future research. The historical background, oceanographic distribution, geology, exploitation, law, and politics of MnO2 are included. Uses of MnO2 in ferrites, semiconductors, catalytic processes, thermoluminescence, and photochromic materials are presented. A select bibliography of 33 items and 129 references are presented at the end of the report.

PB80-808744 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Cermets: Fabrication and Applications. 1973-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1973-Apr 80,
C. Gilbert Young. May 80, 181p
Sponsored in part by National Technical Information Service, Springfield, VA.

Metal and ceramic composites and films are discussed in this collection of citations. Some of the cermet properties covered are high-temperature oxidation resistance, hardness, abrasion resistance, impact resistance, wear resistance, and thermal conductivity. Some applications are as cutters, tool-mounting matrices, armor, electron vacuum tube and MHD components, and insulators. (Contains 173 citations)

PB80-808751 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Cermets: Fabrication and Applications. 1970-April, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1970-Apr 80,
C. Gilbert Young. May 80, 147p
Sponsored in part by National Technical Information Service, Springfield, VA.

Metal and ceramic composites and films are discussed in this collection of citations. Some of the cermet properties covered are high-temperature oxidation resistance, hardness, abrasion resistance, impact resistance, wear resistance, and thermal conductivity. Some applications are as cutters, tool-mounting matrices, armor, electron vacuum tube and MHD components, and insulators. (Contains 150 citations)

PB80-808769 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Cermets: Fabrication and Applications. 1975-April, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for 1975-Apr 80,
C. Gilbert Young. May 80, 145p
Sponsored in part by National Technical Information Service, Springfield, VA.

Metal and ceramic composites and films are discussed in this collection of citations. Some of the cermet properties covered are high-temperature oxidation resistance, hardness, abrasion resistance, impact resistance, wear resistance, and thermal conductivity. Some applications are as cutters, tool-mounting matrices, armor, electron vacuum tube and MHD components, and insulators. (Contains 136 citations)

SAND-79-2375C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Surface Composition and Erosion Yields for CVD TiB sub 2 Films Subjected to Low Energy Deuterium Ion Bombardment.
G. C. Nelson, and J. A. Borders. 1980, 14p
CONF-800455-4
Contract EY-76-C-04-0789
International conference on plasma surface interactions in controlled fusion devices, Garmisch, F.R. Germany, 21 Apr 1980.

The surface composition and low energy sputter yield of deuterium bombarded CVD TiB sub 2 films have been measured. The sputter yield increases with energy up to 1 keV where it reaches a maximum of 0.024 atoms/ion. Above 1 keV the yield decreases due to ion penetration effects. Surface composition measurements using Auger, x-ray photoelectron and secondary ion mass spectroscopies show that a surface layer about 200 A thick is depleted in B during 2 keV deuterium bombardment. This effect is attributed to preferential sputtering. Oxides and deuterides of titanium are also observed on the deuterium bombardment TiB sub 2 surface. (ERA citation 05:020917)

UCRL-84247 PC **A02**/MF **A01**
Naval Weapons Center, China Lake, CA. Michelson Labs.
CO Sub 2 -Laser Polishing of Fused Silica Surfaces for Increased Laser Damage Resistance at 1.06 mu M.
P. A. Temple, D. Milam, and W. H. Lowdermilk. 3 Apr 80, 9p CONF-7910130-2
Contract W-7405-ENG-48
Boulder damage conference, Boulder, CO, USA, Oct 1979.

Bare fused silica surfaces were prepared by subjecting the mechanically polished surface to a rastered cw CO sub 2 laser beam. Analysis shows that this processing causes: (a) removal of a uniform layer of fused silica; and (b) a probable refusing or healing of existing subsurface fractures. The fused silica removal rate is found to be a function of the laser intensity and scan rate. These surfaces are seen to have very low scatter and to be very smooth. In addition, they have exhibited entrance surface damage thresholds at 1.06 mu m, and 1 nsec, which are substantially above those seen on the mechanically polished surface. When damage does occur, it tends to be at a few isolated points rather than the general uniform damage seen on the mechanicaly polished part. In addition to the damage results, we will discuss an observational technique used for viewing these surfaces which employs dark-field illumination. (ERA citation 05:020926)

11C. Coating, Colorants, and Finishes

AD-A085 510/6 PC **A04**/MF **A01**
Civil Engineering Lab (Navy) Port Hueneme CA
Repair System for Damaged Coatings of Navy Antenna Towers. Part II.
Final rept. Oct 77-Sep 78,
L. K. Schwab, and R. W. Drisko. Oct 79, 54p
Rept no. CEL-TN-1562
See also Part 1, AD-A053 507.

Coating materials and cleaning and application procedures and equipment were developed for use in the repair of damaged coatings on Navy steel antenna towers. Experimental coatings were screened by laboratory-accelerated testing before field exposure. In the initial field exposure, 19 of 32 different coating systems provided good protection from corrosion for 3 years to a steel antenna positioner in a marine atmospheric environment. In a later field experiment, 8 of 12 of the better-performing coating systems provided very good protection for 15 months on two steel vortex towers in a very corrosive marine atmospheric environment. Newly developed cleaning and application procedures and equipment were tested during the latter field study. Practices by the Civil Engineering Laboratory currently recommended for coating protection of antenna towers are also presented. (Author)

AD-A085 603/9 PC **A09**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
Materials Coating Techniques.
Lecture series.
Mar 80, 188p Rept no. AGARD-LS-106

No abstract available.

N80-25412/1 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Evaluation of Hot Corrosion Behavior of Thermal Barrier Coatings.
P. E. Hodge, R. A. Miller, and M. A. Gedwill. 1980, 11p NASA-TM-81520, DOE/NASA/2593-16
Contract EF-77-A-01-2593
Presented at Intern. Conf. On Met. Coatings, San Diego, Calif., 21-25 Apr. 1980.

Calcium silicate and yttria stabilized zirconia/MCrAlY thermal barrier coating systems on air-

cooled specimens were exposed to sodium plus vanadium doped Mach 0.3 combustion gases. Thermal barrier coating endurance was determined to be a strong inverse function of ceramic coating thickness. Coating system durability was increased through the use of higher Cr + Al NiCrAl and CoCrAlY bond coatings. Chemical and electron microprobe analyses supported the predictions of condensate compositions and the determination of their roles in causing spalling of the ceramic coatings.

11D. Composite Materials

AD-A085 670/8 PC A03/MF A01
Washington Univ St Louis MO Materials Research Lab
Strength Degradation of Aramid-Fiber/Epoxy Composites.
Final rept.,
Edward M. Wu. Apr 80, 50p AMMRC-TR-80-19
Contract DAAG46-75-C-0081

The moisture absorption kinetics for Kevlar 49 epoxy have been measured for four environmental conditions. The strength degradation for the composite has been systematically measured by six experiments for each of the four states. The tensor polynomial strength coefficients are generalized to represent the strength degradation for the moisture absorbed states. Due to the big difference between tensile and compressive strength for Kevlar 49 composites, analytical representation of the failure surface requires a third-order tensor polynomial. Four additional biaxial experiments are needed to provide the necessary data. The degree of fiber-controlled strength degradation is different from the degradation of matrix-controlled strength, which causes the failure surface to shift and deform. This shift should also be characterized by a third-order tensor polynomial. (Author)

AD-A085 803/5 PC A02/MF A01
Drexel Univ Philadelphia PA Dept of Mechanical Engineering and Mechanics
Utility of a Probability Density Function Curve and F-Maps in Composite Material Inspection.
Rept. no. 1 (Annual),
Joseph L. Rose, Yi H. Jeong, and Michael J. Avioli. 13 Feb 80, 25p
Contract N00014-77-C-0607

The subject of probability density function analysis, an important topic in statistical analysis, is studied in detail in this paper for its utility in nondestructive testing. In addition to the mathematical concepts and analysis, several sample problems in composite material inspection are presented. An F-map, or feature map, presentation is also presented that gives us a new way to examine composite materials. A probability density function basically gives us a plot of the number of times that a particular feature is recorded versus the feature valve itself, a feature being defined as a specific item related to an ultrasonic waveform, possibly center frequency, attenuation at a particular frequency, etc. Probability density function curves are also used to set threshold values in producing an F-map. Sample problems in a graphite polyimide structure and a Boron Aluminum material are covered. (Author)

CONF-800457-1 PC A03/MF A01
Oak Ridge National Lab., TN.
Synthesis and Electronic Applications of Oxide-Metal Eutectic Composites.
J. D. Holder, J. K. Cochran, D. N. Hill, A. T. Chapman, and G. W. Clark. 1980, 34p
Contract W-7405-ENG-26
Verbunderkstoffe 1980, Kontanz, F.R. Germany, 17 Apr 1980.

A review is given of important developments in the synthesis of oxide-metal eutectic composites and the composite application in the continuing development of field emitters. Known metal oxide-metal binary and ternary eutectic systems are listed. The synthesis, electrical conductivity, thermodynamics, and applications are discussed. (ERA citation 05:020934)

N80-25381/8 PC A03/MF A01
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
Short Beam Shear Tests of Polymeric Laminates and Unidirectional Composites.
Final Report.
W. W. Stinchcomb, and E. G. Henneke. Jun 80, 33p NASA-CR-163239
Grant NSG-1254

The application of advanced composite materials in aerospace, ground transportation, and sporting industries are discussed. Failure theories for the design and mechanical behavior of composite materials are emphasized. Methods for detecting specific types of flaws are outlined. The effect of detected flaws on mechanical properties such as stiffness, strength, fatigue lifetime, or residual strength is described.

N80-25383/4 PC A03/MF A01
Lehigh Univ., Bethlehem, PA. Inst. of Fracture and Solid Mechanics.
Sudden Stretching of a Four Layered Composite Plate.
Interim Report.
G. C. Sih, and E. P. Chen. Mar 80, 42p NASA-CR-159870, IFSM-80-102
Grant NSG-3197

An approximate theory of laminated plates is developed by assuming that the extensioral and thickness mode of vibration are coupled. The mixed boundary value crack problem of a four layered composite plate is solved. Dynamic stress intensity factors for a crack subjected to suddenly applied stress are found to vary as a function of time and depend on the material properties of the laminate. Stress intensification in the region near the crack front can be reduced by having the shear modulus of the inner layers to be larger than that of the outer layers.

N80-25384/2 PC A04/MF A01
Lehigh Univ., Bethlehem, PA. Inst. of Fracture and Solid Mechanics.
Sudden Bending of Cracked Laminates.
Interim Report.
G. C. Sih, and E. P. Chen. Feb 80, 53p NASA-CR-159860, IFSM-80-103
Grant NSG-3197

A dynamic approximate laminated plate theory is developed with emphasis placed on obtaining effective solution for the crack configuration where the 1/square root of r stress singularity and the condition of plane strain are preserved. The radial distance r is measured from the crack edge. The results obtained show that the crack moment intensity tends to decrease as the crack length to laminate plate thickness is increased. Hence, a laminated plate has the desirable feature of stabilizing a through crack as it increases its length at constant load. Also, the level of the average load intensity transmitted to a through crack can be reduced by making the inner layers to be stiffer than the outer layers. The present theory, although approximate, is useful for analyzing laminate failure to crack propagation under dynamic load conditions.

PATENT-4 180 428
Not available NTIS
Department of Energy, Washington, DC.
Method for Making Hot-Pressed Fiber-Reinforced Carbide-Graphite Composite.
Patent,
R. E. Riley, and T. C. Wallace, Sr. Filed 23 Jun 78, patented 25 Dec 79, 4p PAT-APPL-918 258
Supersedes PAT-APPL-918 258-78.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A method for the chemical vapor deposition of a uniform coating of tantalum metal on fibers of a woven graphite cloth is described. Several layers of the coated cloth are hot pressed to produce a tantalum carbidegraphite composite having a uniformly dispersed, fine grained tantalum carbide in graphite with compositions in the range of 15 to 40 volume percent tantalum carbide. (ERA citation 05:024455)

PATENT-4 201 611
Not available NTIS
Department of the Air Force Washington DC
Carbon/Carbon Composite for Re-entry Vehicle Applications.
Patent,
Edward R. Stover. Filed 17 Apr 78, patented 6 May 80, 4p AD-D007 284/3, PAT-APPL-896 861
Supersedes PAT-APPL-896 861-78, AD-D004 956.
Availabilaity: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A fine textured, high density, three directional carbon-carbon fiber composite material with an axially to laterally oriented fiber ratio of 1.5 to 1 or higher and a density of 185 g/cu cm or higher. (Author)

11E. Fibers and Textiles

PAT-APPL-6-034 877 PC A02/MF A01
Department of Agriculture, Washington, DC.
Tris(N-carbalkoxylaminomethyl)phosphine Oxides and Sulfides.
Patent Application,
Arlen W. Frank. Filed 30 Apr 79, 23p PB80-191679
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The title compounds, having the formula (RO2CNHCH2)3PY where Y = oxygen or sulfur, are prepared by reacting a tris(N-carbalkoxylaminomethyl)phosphine, having the formula (RO2CNHCH2)3P, with an oxidizing or sulfurizing agent. The products, after methylolation with formaldehyde, are useful as finishing agents for imparting flame retardant properties to cotton fabrics.

PAT-APPL-6-098 459 PC A03/MF A01
Department of Agriculture, Washington, DC.
Quaternary Ureidomethyl Phosphonium Salts.
Patent Application,
Arlen W. Frank. Filed 29 Nov 79, 36p PB80-191661
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Novel quaternary ureidomethyl phosphonium salts are prepared by condensing a urea having the formula RNHC(O)NR'(R double prime) with a quaternary hydroxymethyl phosphonium salt having the formula (HOCH2)4P(+)X(-) in a molar ratio of at least 2:1. The products, which are characterized by the absence of residual hydroxymethyl groups, are useful as finishing agents for imparting flame retardant properties to cotton fabrics.

PAT-APPL-6-118 948 PC A03/MF A01
Department of Agriculture, Washington, DC.
Improved Abrasion Resistance and Strength of Cotton-Containing Fabric Made Resilient with N-methylolacrylamide-Type Reagent.
Patent Application,
Stanley P. Rowland, Florine A. Blouin, and Frederick F. Shih. Filed 6 Feb 80, 28p PB80-191745
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

High levels of durable-press appearance rating and conditioned wrinkle recovery angle together with improved abrasion resistance, breaking strength, and tearing strength are the primary textile qualities imparted to celluiosic textile with aqueous solutions containing N-methylolacrylamide-type reagents, a salt of persulfuric acid, and an alkali metal phosphate, which may be supplemented with standard wetting agents and fabric softeners.

PAT-APPL-6-118 949 PC A02/MF A01
Department of Agriculture, Washington, DC.
Process for Producing Durable-Press Cotton Fabrics with Improved Balances of Textile Properties.
Patent Application,
Stanley P. Rowland. Filed 5 Feb 80, 25p PB80-191729
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

improved levels of abrasion resistance, breaking strength are coupled with high levels of resilience, as measured by durable-press appearance rating and wrinkle recovery angles, by a process in which cotton or cotton-containing fabric is treated with poly-functional N-methylol reagents, a Bronsted acidic catalyst or Bronsted acid-generating catalyst and selected phosphate salts. The fabric is impregnated with these and supplementary agents as desired and cured by conventional methods.

PAT-APPL-6-145 107 PC **A02/MF A01**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
Heat Sealable, Flame and Abrasion Resistant Coated Fabric.
Patent Application,
R. P. Tschirch, and K. R. Sioman. Filed 30 Apr 80, 17p N80-24440/3, NASA-CASE-MSC-18382-1
Contract NAS9-13979
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A flexible, lightweight air impermeable coated fabric was developed to replace the flame retardant neoprene coated nylon fabric used as the micrometeorite protection layer in the intravehicular thermomicrometeorite garment. The elastometric compositions are comprised of thermoplastic polyurethane polymer and flame retarding amounts of a filler selected from decabromodiphenlyoxide and antimony oxide in a 3:1 weight ratio, and decabromodiphenyloxide, antimony oxide, and ammonium polyphosphate in as 3:1:3 weight ratio. The compounds were dissolved at about 40% solids in tetrahydrofuran. Films cast from the solution were dried and bonded to the fabric under heat and pressure at 400 F, 30 psi with 10 sec dwell time. Either heat or dielectric sealing procedures can be used.

PATENT-4 194 032
Not available NTIS
Department of Agriculture, Washington, DC.
Transfer Techniques for Producing Flame Retardant Cotton Fabrics.
Patent,
Robert J. Harper, Jr., Timothy A. Calamari, Jr., and Sidney P. Schreiber. Filed 5 Mar 75, patented 18 Mar 80, 9p PB80-190440, PAT-APPL-555 486
Supersedes PB-247 858.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

Flame resistance sufficient to enable cellulose containing materials to pass modern flammability standards has been imparted to these materials by application of an aqueous solution containing a methylol phosphorus compound followed by heat drying to about 15% or less moisture content, and finally by polymerizing the phosphorus material in the cellulose containing material by any one of several indirect aqueous ammonia curing techniques. The invention provides an improved process for flame proofing cellulosic materials which avoids the use of ammonia gas during the cure and which results in little or no loss in tensile strength or in an undesirable change in hand. Cellulosic textiles treated by this process retain their flame resistant properties after repeated laundering.

PATENT-4 196 302
Not available NTIS
Department of Agriculture, Washington, DC.
Quaternary Phosphonium Salts Bearing Carbamate Groups.
Patent,
Arlen W. Frank. Filed 6 Mar 79, patented 1 Apr 80, 6p PB80-190408, PAT-APPL-018 087
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

Novel quaternary phosphonium salts, bearing one or more carbamate groups attached through nitrogen, are prepared by condensing a hydroxymethyl phosphonium salt having the formula (R(4 - n)P(CH2OH)n)(+)X(-) with an alkyl carbamate having the formula NH2CO2R'. The products, which have the general formula (R(4 - n)P(CH2NHCO2R')n)(+)X(-), are useful as finishing agents for imparting flame retardant or durable press properties to cotton fabrics.

PATENT-4 204 072
Not available NTIS
Department of Agriculture, Washington, DC.
Tris(N-carbalkoxylaminomethyl)-phosphines.
Patent,
Arlen W. Frank. Filed 29 Nov 78, patented 20 May 80, 9p PB80-192248, PAT-APPL-964 751
Supersedes PB-290 544.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

The title compounds, having the formula (RO2CNHCH2)3P, are prepared by reacting a quaternary phosphonium salt, having the formula (RO2CNHCH2)4P(+)X(-), with a base, preferably one that is capable of reacting with and thereby inactivating the by-product formaldehyde or formaldehyde derivative. The products are useful as intermediates for the preparation of finishing agents that impart flame retardant properties to cotton fabrics.

11F. Metallurgy and Metallography

AD-A085 342/4 PC **A03/MF A01**
Construction Engineering Research Lab (Army) Champaign IL
Determination of the Effect of Current and Travel Speed of Gas Metal-Arc Welding on the Mechanical Properties of A36, A516, and A514 Steels.
Final rept.,
R. Weber. May 80, 42p Rept no. CERL-TR-M-278

This study was performed to determine the limits on current and travel speed-in particular, nugget area-as defined by the results of tests to determine tensile and impact properties of butt joint welds produced by fully automatic gas metal-arc welding (GMAW) in carbon steel (A36), pressure-vessel steel (A516), and high-strength, low-alloy steel (A514).

AD-A085 354/9 PC **A02/MF A01**
Massachusetts Inst of Tech Cambridge Dept of Materials Science and Engineering
Structure and Properties of Rapidly Solidified 2000 Series Al-Li Alloys.
Technical rept.,
N. J. Grant, S. Kang, and W. Wang. 20 May 80, 23p
Contract N00014-78-C-0385, ARPA Order-3558
Presented at the International Conference on Aluminum-Lithium Alloys (1st), Stone Mountain, GA, 19-21 May 80.

The literature appears convincing that of the Al-Li alloys, Al-Cu-Li provides stronger alloys than does Al-Mg-Li. Yet, such earlier studies were based on ingot technology where segregation problems could conceivably have worsened actual comparisons. Further, the phase diagrams for these two ternary systems are poorly known, especially if significant additions of Mn, Cd, Cr, Ti, Zr and other elements are made. In fact the Al-Cu-Mg-Li quaternary based on the 2024 alloy gave some rather excellent combinations of strength and toughness when the alloys were made from rapidly solidified (RS) particulates. Continuing alloy development, structure refinement, and property assessments, based on RS technology, are the basis of this study. Both 2020 and 2024 base alloys are being prepared by RS powder technology (ultrasonic gas atomization with quench rates of ten to the 4th power to ten to the 5th power K/s); lithium contents from about 1 to 3 weight percent are being studied at several different ratios of Cu to Li. Phase identification studies are being planned but only preliminary data are available. Mechanical properties (smooth bar tension tests) appear excellent for the Al-Cu-Li alloys, significantly better than for the 2024 base alloy. Notch toughness tests are still a problem even though improvements are being made. (Author)

AD-A085 400/0 PC **A03/MF A01**
Massachusetts Inst of Tech Cambridge Dept of Materials Science and Engineering
Submerged Arc Welding of Titanium.
Technical rept. no. 3, 1 Aug 78-31 Jul 79,
G. Hunter, G. B. Kenney, M. Ring, B. A. Russell, and T. W. Eagar. 30 Sep 78, 40p
Contract N00014-77-C-0569

Studies of flux shielded welding of titanium indicate that acceptable submerged arc weld bead shape may not be attained with pure CaF2 flux. Addition of chlorides to the CaF2 flux improves the weld bead shape but reduces the deoxidizing potential of the flux. Use of cored electrodes containing chloride salts produces the most acceptable weld beam profiles. Preliminary studies of titanium weld penetration in the presence of several fluoride salts indicate that changes in flux chemistry may be useful in modifying the weld bead profile. Economic analysis indicates that SAW of titanium can only be competitive with gas metal arc welding if the flux cost can be reduced significantly. A possible method of reducing flux cost may be recycling of the fused slag. (Author)

AD-A085 569/2 PC **A02/MF A01**
Rome Air Development Center Griffiss AFB NY
Electrolytic Separation of Al3Ni Fibers from the Eutectic Alloy, Al-Al3Ni.
Technical rept.,
Kenneth P. Quinlan, and Joseph J. Hutta. Dec 79, 25p Rept no. RADC-TR-79-329

An electrolytic procedure was developed to remove the trialuminum nickel fibers from the aluminum matrix in the eutectic alloy, Al-Al3Ni. The procedure consists of electrolyzing the aluminum matrix at potentials ranging from -0.8 to +0.5 volt (vs. S.C.E.) in a 1M potassium hydroxide electrolyte. Scanning electron photomicrographs showed that the separated Al3Ni fibers are intact. Anoidic polarization studies with aluminum-nickel alloys illustrated that the presence of nickel protects aluminum from oxidation. Studies with a special fabricated platinum electrode demonstrated that the Al3Ni fibers are not oxidized within the potential range of -0.8 to +0.5 volt (vs S.C.E.) in a 1M potassium hydroxide electrolyte. This decreased rate of oxidation of aluminum in the Al3Ni fibers is correlated with the low rate of diffusion of the aluminum in the Al3Ni orthorhombic crystals. The procedure dose not require the stringent conditions as in other methods of producing Al3Ni fibers from eutectic alloys. The method has the additional advantage of being applicable to a continuous process where the fibers can be removed and the electrolyte replenished. (Author)

AD-A085 625/2 PC **A02/MF A01**
Battelle Columbus Labs OH
Dynamic Crack Propagation under Impact Loading.
M. F. Kanninen, P. C. Gehlen, C. R. Barnes, R. G. Hoagland, and C. T. Hahn. 1979, 19p
Contract N00014-77-C-0576
Pub. in Nonlinear and Dynamic Fracture Mechanics, v35 p185-200 1979.

No abstract available.

AD-A085 627/8 PC **A02/MF A01**
Army Materials and Mechanics Research Center Watertown MA
On Adiabatic Shear Band Determinations by Surface Observations.
Final rept.,
Michael R. Staker. Mar 80, 11p Rept no. AMMRC-TR-80-6

Two cracking mechanisms, adiabatic shear band cracking and ductile dimpled shear cracking, have been observed in hollow, right circular cylinders of AISI 4340 steel, which were explosively expanded in a quick-stop containment apparatus. It is concluded that distinction of cracking mechanisms cannot be made without the use of metallographic sectioning, as the external appearances of both types of cracks are identical. These exploding cylinder results demonstrate the inaccuracies associated with determining the presence or density of adiabatic shear bands only from surface observations. (Author)

AD-A085 651/8 PC **A05/MF A01**
Lockheed Missiles and Space Co Inc Palo Alto CA
Palo Alto Research Lab

Development of Advanced Aluminum Alloys from Rapidly Solidified Powders for Aerospace Structural Applications.
Interim technical rept. 5 Sep 79-4 Feb 80,
R. E. Lewis, I. G. Palmer, D. D. Crooks, H. Paris, and F. Billman. Mar 80, 85p Rept no. LMSC/D686125
Contract F33615-78-C-5203, ARPA Order-3417

Advanced aluminum alloys are being developed that will provide majors payoffs in terms of weight savings for new aerospace structures. The two property goals are: (1) a 30-percent increase in modulus of elasticity-to-density ratio, and (2) a 20-percent increase in modulus of elasticity-to-density ratio plus a 20-percent increase in strength-to-density ratio, when compared to Al 7075-T76 and without a significant loss in other properties important for structural applications. The program is organized into three phases: 1 - a fundamental alloy and process development study; 2 - scale-up of two best alloys and evaluation of mill product forms. (Author)

AD-A085 719/3 PC **A02**/MF **A01**
Army Armament Research and Development Command Watervliet NY Large Caliber Weapon Systems Lab
A Wide Range K Expression for the C-Shaped Specimen.
Technical rept.,
J. Kapp, J. C. Newman, and J. H. Underwood. Mar 80, 20p ARLCB-TR-80009, AD-E440 068
Presented at the ASTM Taskgroup E24.01.05, Pittsburgh, PA, 30 Oct 79.

A new expression has been developed to calculate K for the C-shaped specimen over a wider range of specimen parameters, namely a/W, X/W, and r sub 1/r sub 2 than had previously been available. The rationale used to derive the expression was to utilize known stress intensity factor solutions for short and deep cracks to develop a nondimensional form of K which approaches finite values as a/W goes to both zero and one. Numerical K solution results from prior work were then nondimensionalized to this form with the finite limiting values, and the dependent of K on a/W was determined by multi-variable, linear regression. The final expression agrees with the numerical K solutions within plus or minus 1.0% for .45 less than or equal to a/W less than or equal to .55 for all r sub 1/r sub 2 and X/W of either 0 or .5; within plus or minus 1.5% for .2 less than or equal to a/W less than or equal to 1 for all r sub 1/r sub 2 and X/W equal to 0 or .5; and within about plus or minus 3% for .2 less than or equal to a/W less than or equal to 1 for all r sub 1/r sub 2 and 0 less than or equal to X/W less than or equal to 1. The accuracy of this expression will allow expanded use of the C-shaped specimen for R-curve determination and fatigue crack growth rate testing.

AD-A085 756/5 PC **A16**/MF **A01**
Army Industrial Base Engineering Activity Rock Island IL
Metals Subcommittee Report - Manufacturing Technology Advisory Group.
Final rept.,
Gordon Ney. Jan 80, 351p

This document summarizes the mission, organization, methodology and accomplishments of the Metals Subcommittee of MTAG. Program status: past, present and projected trends are outlined by process or technical objective. (Author)

ANL-79-92 PC **A02**/MF **A01**
Argonne National Lab., IL.
Effects of Environment on the Low-Cycle Fatigue Behavior of Type 304 Stainless Steel.
P. S. Maiya, and W. F. Burke. Dec 79, 19p
Contract W-31-109-ENG-38

The low-cycle fatigue behavior of Type 304 stainless steel has been investigated at 593 exp 0 C in a dynamic vacuum of better than 1.3 x 10 exp -6 Pa (10 exp -8 torr). The results concerning the effects of strain range, strain rate and tensile hold time on fatigue life are presented and compared with results of similar tests performed in air and sodium environments. Under continuous symmetrical cycling, fatigue life is significantly longer in vacuum than in air; in the low strain range regime, the effect of sodium on fatigue life appears to be similar to that of vacuum. Strain rate (or frequency) strongly influences fatigue life in both air and vacuum. In compressive hold-time tests, the effect of environment on life is similar to that in a continuous-cycling test. However, tensile hold times are nearly as damaging in vacuum as in air. Thus, at least for austenitic stainless steels, the influence of the environment of fatigue life appears to depend on the loading waveshape. (ERA citation 05:020877)

CONF-781194-5 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Effects of Si and Ti on the Phase Stability and Swelling Behavior of AISI 316 Stainless Steel.
E. H. Lee, A. F. Rowcliffe, and E. A. Kenik. 1978, 28p
Contract W-7405-ENG-26
Workshop on solute segregation and phase stability during irradiation, Gatlinburg, TN, USA, 1 Nov 1978.

Swelling behavior of neutron irradiated stainless steels is influenced by solute segregation and precipitation phenomena. The extent to which in-reactor swelling behavior may be simulated by heavy ion irradiation depends upon the extent to which in-reactor phase changes are reproduced; this question is addressed by comparing the precipitation behavior under neutron irradiation with behavior during 4 MeV Ni ion irradiation for AISI 316 stainless steel and a related stainless steel containing additions of titanium and silicon. The results are discussed qualitatively in terms of the effects of damage rate on solute segregation and the effects of displacement cascades on the dissolution of particles. It is shown that the partitioning of elements into various phases during irradiation is not a sufficient condition for the initiation of swelling in stainless steels modified with silicon and titanium. It is also necessary for helium to be generated simultaneously with the breakdown of the matrix into various phases; it is believed that helium trapping at the growing particle-matrix interface is responsible for the observed physical association between voids and precipitates. (ERA citation 05:020905)

CONF-800231-2 PC **A02**/MF **A01**
Argonne National Lab., IL.
Deviation of Longitudinal and Shear Waves in Austenitic Stainless Steel Weld Metal.
D. S. Kupperman, and K. J. Reimann. 1980, 16p
Contract W-31-109-ENG-38
International conference on nondestructive evaluation in the nuclear industry, Salt Lake City, UT, USA, 11 Feb 1980.

One of the difficulties associated with the ultrasonic inspection of stainless steel weld metal is the deviation of the ultrasonic beams. This can lead to errors in determining both the location and size of reflectors. The present paper compares experimental and theoretical data related to beam steering for longitudinal and shear waves in a sample of 308 SS weld metal. Agreement between predicted and measured beam deviations is generally good. Reasons for discrepancies are discussed. (ERA citation 05:020870)

CONF-800427-2 MF **A01**
Oak Ridge National Lab., TN.
Tritium Permeability of Structural Materials and Surface Effects on Permeation Rates.
J. T. Bell, J. D. Redman, and H. F. Bittner. 1980, 18p
Contract W-7405-ENG-26
Tritium technology in fission, fusion, and isotopic application, Dayton, OH, USA, 29 Apr 1980.
Microfiche copies only.

Tritium management in any system always will include containment such that tritium release rates will be less than established limits and also will be as low as practical. The well known properties of hydrogen to permeate through most materials make the complete containment of tritium an impossible task. However, tritium release rates from a given system can be minimized by two primary efforts. First is the selection of a compatible containment material which frequently also will be the structural material. This effort should include films and barriers that would be compatible with the structural material. Second and sometimes more important, the material should have surface chemistry in the particular system that continuously impedes tritium permeation. (ERA citation 05:020893)

CONF-800609-1 PC **A03**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Mechanical and Physical Properties of Irradiated Type 348 Stainless Steel.
J. M. Beeston. 1980, 45p
Contract EY-76-C-07-1570
10. international symposium on effects of radiation on materials, Savannah, GA, USA, 3 Jun 1980.

A type 348 stainless steel in-pile tube irradiated to a fluence of 3 x 10 exp 22 n/cm exp 2 , E > 1 MeV (57 dpa), was destructively examined. The service had resulted in a maximum total creep of 1.8% at the high fluence. The metal temperature ranged between 623 and 652 exp 0 K, hence the thermal creep portion of the total was negligible. Total creep was greater than had been anticipated from creep data for austenitic stainless steels irradiated in other reactors. The objectives of the destructive examination were to determine the service-induced changes of mechanical and physical properties, and to assess the possibility of adverse effects of both these changes and the greater total creep on the prospective service life of other tubes. (ERA citation 05:020907)

COO-2218-148 PC **A08**/MF **A01**
Illinois Univ. at Urbana-Champaign.
Helium-Induced Blistering and Volume Swelling in Nickel.
G. R. Fenske. 1979, 165p
Contract AS02-76ET52040

The results of an experimental investigation of He-induced blistering are presented. The mechanisms involved in blistering were examined by observing the microstructure of the implanted region using TEM. The volume swelling was measured as a function of the implant depth. The investigation revealed factors important in understanding the mechanisms involved in blister formation. First, a direct comparison of measured skin-thicknesses with the location of the maximum volume swelling demonstrated that the skin separates at the peak swelling depth, not at the end of the swelling profile. Second, an examination of the assumptions that have been used to predict skin-thicknesses revealed that the differences between predicted and measured skin thicknesses at low energies can be attributed to: failure to account for volume swelling in the skin, using a Gaussian approximation to the range profile, or one generated with a Monte-Carlo code, and uncertainties in the electronic stopping powers. Beyond a certain dose, the density of cavities in the peak-swelling region decreased with increasing dose; indicating that cavity coalescence does occur. A calculation of the He concentration required to fracture the load-bearing cross section between the cavities revealed that a sufficient quantity of He was available to generate the required gas pressures. These observations indicate that models based on coalescence followed by gas-driven deformation provide an accurate description of the mechanisms involved in blistering and they can accurately predict skin thicknesses at low energies. (ERA citation 05:020908)

COO-3166-30 PC **A03**/MF **A01**
Cornell Univ., Ithaca, NY. Dept. of Materials Science and Engineering.
Environment and Fracture. Progress Report.
H. H. Johnson. Mar 79, 31p
Contract EY-76-S-02-3166

Results are presented of an investigation of hydrogen trapping in iron and iron base alloys. Both physical and chemical trapping were studied. Chemical trapping of H is found in H attack of plain carbon and alloy steels. Diffusion H reacts with carbon to form methane which leads to deterioration of microstructure, and degradation of mechanical properties. Physical trapping of H is evident at lower temperatures. (ERA citation 05:020880)

COO-4385-3 PC **A02**/MF **A01**
Notre Dame Univ., IN.
Pore Shrinkage and Ostwald Ripening in Metallic Systems. Progress Report, July 1, 1978-June 30, 1979.
G. C. Kuczynski, and C. W. Allen. Mar 79, 15p

Contract EG-77-S-02-4385

The new theory of Ostwald ripening phenomena is gradually unfolding. Based on the principle of minimum rate of entropy production, the general method including the mathematical formalisms of variational calculus, is now understood and has been applied to the case of annealing of void structures, a situation somewhat simpler to model than is particle coarsening. The resultant void distribution function is compared with that expected from the LSW theory and with experiments. Developments in three areas are described: generation and annealing of voids in HVEM, distribution of Ni sub 3 Al in Ni-Al alloys, and production of reproducible pore structures in nickel powder compacts. (ERA citation 05:022658)

DOE/ER/10433-1 PC **A03**/MF **A01**
Minnesota Univ., Minneapolis. Dept. of Chemical Engineering and Materials Science.
Microstructural Approach to Fatigue Crack Processes in Polycrystalline BCC Materials. Annual Technical Progress Report I.
W. W. Gerberich. 1 Apr 80, 30p
Contract AC02-79ER10433

Two commercial low-alloy high-strength steels, four Fe-base alloys, and Ti-30 Mo were evaluated. Dislocation dynamics, strain-rate sensitivity and fatigue and fracture characterization were studied. (ERA citation 05:020881)

DP-MS-79-61 PC **A02**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Hydrogen Assisted Fracture of Sensitized Type 304L Austenitic Stainless Steel.
G. R. Caskey, Jr. 1980, 25p CONF-800205-5
Contract EY-76-C-09-0001
American Institute of Metallurgical Engineers meeting, Las Vegas, NV, USA, Feb 1980.

Sensitized specimens of Type 304L stainless steel were tensile tested in atmospheres of hydrogen and helium at high pressure, and in air at ambient pressure. Comparison tensile tests were made with solution-annealed specimens of Type 304L stainless steel in the same atmosphere. When both specimens were tested in high-pressure hydrogen, the sensitized specimens had greater loss in ductility and increased tendency to intergranular fracture. For the sensitized specimens, plastic strain to failure (epsilon/sub p/ = 1n A sub 0 /A/ sub f/) in hydrogen at 69 MPa was reduced by 60 to 70% in comparison to similar tests in helium. In addition, a notch with a stress concentration factor of about 3 reduced plastic strain an additional 50 to 60%. In all cases, the nominal tensile strength of Type 304L stainless steel was increased by the notch. There was no evidence of intergranular failure in notched specimens of solution-annealed Type 304L stainless steel tested in high-pressure hydrogen environments. (ERA citation 05:020882)

IA-1351 MF **A01**
Israel Atomic Energy Commission, Yavne. Soreq Nuclear Research Center.
NMR Study of the Magnetic Metals Cobalt and Nickel in the Paramagnetic and Ferromagnetic States.
M. Shaham. Feb 79, 97p
In Hebrew.Thesis.
U.S. Sales Only. Microfiche copies only.

Results of NMR measurements in the 3d - electron transition metals nickel and cobalt are presented. Measurements were performed in the paramagnetic and ferromagnetic states, as close as possible, experimentally to the Curie transition temperature Tsub(c). It is shown that NMR is a powerful tool to study the behavior of magnetic metals. The developed experimental technique enables measurements in an extended temperature range in metals with strongly temperature dependent parameters. (Atomindex citation 11:495553)

IFSM-79-97 PC **A03**/MF **A01**
Lehigh Univ., Bethlehem, PA.
Fracture Mechanics and Surface Chemistry Studies of Steels for Coal Gasification Systems. Second Annual Report, November 1, 1977-October 30, 1978.
R. P. Wei, and G. W. Simmons. Dec 78, 48p

Contract EX-76-S-01-2527

Steels used in coal gasification vessels and piping are exposed to mixtures of hydrogen, water vapor (steam), hydrogen sulfide, methane, carbon monoxide, carbon dioxide, and other gases at temperatures and pressures up to 2000 exp 0 F (approx. 1370 exp 0 K) and 1500 psia (approx. 10.3 MN/m exp 2). Such mixtures, under certain operating conditions, can either enhance or inhibit embrittlement of these steels (that is, by the enhancement of crack growth by hydrogen and by the hydrogenous gases). The principal goal is to identify and establish those conditions for inhibition and for enhancement of embrittlement through a coordinated set of fracture mechanics and surface chemistry experiments on the crack growth kinetics, and on the thermodynamics and kinetics of surface reactions. The specific objective is to evaluate the thermodynamic conditions for surface film (oxides, sulfides, and carbides) formation and reduction as a potential criterion for defining safe operating conditions (gas composition, pressure and temperature) for steels used, or being considered for use, in pressure vessels and piping for coal gasification systems. A 2-1/4Cr-1Mo (ASTM A542, Class 2) steel has been selected for study. Since the potentially embrittling gases in the coal gasification environments are H sub 2 , H sub 2 O, H sub 2 S and CH sub 4 , crack growth behavior in these gases will be determined to identify the conditions for embrittlement. Selected mixtures (H sub 2 /H sub 2 O, H sub 2 /H sub 2 S, H sub 2 CO/CO sub 2) and test conditions will then be examined to establish and verify possible correlations between the conditions for surface film formation or reduction and the propensity for cracking. The initial program will be restricted principally to a total pressure of 25 psia (0.27 MN/m exp 2) and temperatures ranging from room temperature to 600 exp 0 F. (ERA citation 05:021616)

INIS-mf-4731 PC **A06**/MF **A01**
Trondheim Univ. (Norway). Inst. for Roentgentekniikk.
Investigations on the Soft X-Ray Integrated Intensity Measurement Technique for Studying the Electron Structure of Solids.
T. Ustad. Dec 76, 103p
Thesis.
U.S. Sales Only.

The present work represents a study of the method connected with the use of the electron microprobe as a tool for the investigation of a possible charge transfer in alloys of 3d- transition metals. First, a theoretical background concerning the intensity distribution in the valence band spectra, the formation of energy bands and theories for the behaviour of the d- bands is briefly treated. The choice of experimental conditions, especially the excitation voltage, is of great importance and is explained in detail. Further recording of valence band emission spectra and the registration of the integrated intensities for the alloys in question is discussed. Accurate point by point registrations of all the band profiles have been carried out, together with necessary separations of overlapping bands. The registerted band-spectra are subject to a series of corrections where the self-absorption and background effects are of decisive importance. The necessity of recording the integrated band intensities, instead of peak values, involves matrix corrections over a whole range of wavelengths. The results from the Wenger method measurements seem to be in favour of the minimum polarity model in the case of cobalt. On the other hand, the nickel measurements seem to indicate an increase in the number of d- electrons per Ni atom with increasing Co content. However, the nickel results ought to be verified by other measurements, or by corresponding results in the cobalt side. This is not the case, and since the cobalt measurements are most reliable, the nickel results may possibly imply that some reminiscences of the systematic errors are involved. (Atomindex citation 11:497945)

INIS-mf-4856 MF **A01**
Stuttgart Univ. (Germany, F.R.).
Brittleness, Microcracking and Crack Propagation in Stress-Relief Annealing of Welded Low-Alloyed NiMoCr Steels.
H. Y. Chen. 5 Jul 76, 175p
In German.Thesis.
U.S. Sales Only. Microfiche copies only.

It in possible to produce the essentially corresponding microstructural states as well as micro or macro crack formation by simulation welding of the coarse grain zone of welded seams and to analyze the conditions for brittleness and crack formation. The metallurgical procedures in the heat affected zone of a welded joint are described. It could be seen from metallographic polished specimens that the crack formation can persue the triple point theory as well as the carity theory. The heating and relaxing process was analyzed on a model and the latter described by the pure relaxation test, relaxation test according to Murray and time-fracture test. The time-fracture test was mainly applied to investigate a possible decrease in toughness and crack formation because it normally does not work in relaxation tests - contrary to the component - to produce crack formation. In order to determine how long it takes for the first micro cracks to occur at a defined stress in short time-fracture testing, metallographic specimens were prepared as well as notched bar impact beneting tests performed. There is a distinct dependence between lasting expansion in the short time-fracture test, notched bar impact strength and the number of cracks; the notched bar impact strength decreases with increasing microcracking (increasing permanent expansion). One must note here that the microstructure can still carry full load although its toughness value has decreased. The maximum brittleness state of the materials depends on time and temperature. (Atomindex citation 11:499165)

INIS-mf-5388 PC **A05**/MF **A01**
Erlangen-Nuernberg Univ. (Germany, F.R.).
Perturbation of the gamma -Angular Distribution by Radiation Defects after Nuclear Reactions in Zn-Single Crystals.
W. Sandner. 23 Nov 77, 77p
In German.Thesis.
U.S. Sales Only.

The influence of radiation defects, induced after nuclear reactions by deceleration of high energetic recoil atoms, on nuclear quadrupol interaction has been studied by the method of time differential observation of the gamma -angular distribution in Zn single crystals. The 9/2 exp + isomeric states of exp 67 Ge and exp 69 Ge and 5/2 exp - state of exp 71 Ge are used as probes for measurements in the temperature range between 77 exp 0 K and 633 exp 0 K. As expected the electric field gradient temperature dependence shows a T exp 3 / exp 2 -behaviour. Between 450 exp 0 K and 400 exp 0 K the modulation amplitudes decrease in the case of the 9/2 exp + and 5/2 exp - states by 90% and 60% respectively. Below about 450 exp 0 K the time spectra are damped with decreasing temperature, exhibiting a significant maximum at about 380 exp 0 K to 430 exp 0 K. Approximately in the same temperature a significant shift of region the experimental time-zero-point relative to the point fitted to the spectra is observed. All these effects are explained by radiation defects of the host lattice, which are induced by recoil of the probe atoms after the nuclear reaction - The experimental results can only be explained partly by the well known model of strong dynamic quadrupolar perturbating interactions with defect induced electric field gradients. In order to explain the shift of the time -zero-point as well as the damping maximum by static perturbation interaction, an alternative model has been developed. (Atomindex citation 11:497929)

INKA-Conf-79-225-002 MF **A01**
Max-Planck-Inst. fuer Metallforschung, Stuttgart (Germany, F.R.). Inst. fuer Werkstoffwissenschaften.
Stress Relaxation and Activation Volume at the Yield Point of Cold Worked and Neutron Irradiated Copper Single Crystals.
D. Brunner, and J. Diehl. 1979, 6p CONF-790801-9
International conference on the strength of metals and alloys, Aachen, F.R. Germany, Aug 1979.
U.S. Sales Only. Microfiche copies only.

The effective activation volume of slip is studied after neutron irradiation in as grown crystals as well as in predeformed ones by means of stress relaxation tests between 20 exp 0 K and 200 exp 0 K. The activation volume corresponding to the initial strain rate is found to be always higher in predeformed crystals than in as grown ones. During

stress relaxation the flow stress tau decreases linearly with ln(-tau) (indicating a constant activation volume) only in rare cases. Depending on predeformation and temperature several types of deviations from straight lines are observed: monotoneously bent curves, strong scattering of data points not fitting smooth curves or systematic deviations from straight lines at the beginning of relaxation. Accordingly the effective activation volumes and their dependences on stress seem to behave in a strange manner. By the aid of a previously proposed model for the deformation within the yield point elongation the results can be interpreted qualitatively by taking into account the inhomogeneity of slip and work hardening, allowing a more reliable judgement on the real activation volumes, on which a better understanding of the superposition of the two hardening mechanisms involved here can be based. (Atomindex citation 11:499326)

INKA-Conf-79-225-003

PC **A02**/MF **A01**

Institut National des Sciences Appliquees, Villeurbanne (France).

Plastic Behaviour of Zircaloy-4 in the Temperature Range 77-1000 exp 0 K.

J. L. Derep, S. Ibrahim, D. Rouby, G. Fantozzi, and P. Gobin. 1979, 6p CONF-790801-7

International conference on the strength of metals and alloys, Aachen, F.R. Germany, Aug 1979.

U.S. Sales Only.

Tensile tests were carried out on Zircaloy-4 over a temperature range 77-1000 exp 0 K. So, we have determined the flow stress variations as a function of temperature and strain rate. Two thermally activated zones were observed between about 77 and 600 exp 0 K, a plateau stress between 600 and 700 exp 0 K and an other thermally activated zone above 700 exp 0 K. The various mechanisms which can be responsible for the thermally activated and athermal zones are discussed in the light of experimental results. The mechanical behaviour of Zircaloy-4 appears similar to the zirconium-oxygen alloys one. (Atomindex citation 11:499190)

INKA-Conf-79-225-004

PC **A02**/MF **A01**

Tohoku Univ., Sendai (Japan).

Analysis of Steady-State Creep of Fe-Mo Alloys from the Viewpoint of Recovery.

K. Maruyama, S. Karashima, and H. Oikawa. 1979, 6p CONF-790801-8

International conference on the strength of metals and alloys, Aachen, F.R. Germany, Aug 1979.

U.S. Sales Only.

A theoretical equation to d evaluate the steady-state creep-rates, d epsilon/dtsub(s), based on a recovery creep model is derived: epsilonsub(s)/dt proportional to r/sigma exp 2 sub(a) x lambda exp 2 , where r is the recovery rate, which can be determined from results of stress-reduction tests, deltasub(a) the applied stress, and lambda the dislocation link-length. Two cases of recovery are considered, i.e., recovery of dislocation networks at sub-boundaries and that of three-dimensional networks within subgrains. The high-temperature steady-state creep of Fe-Mo solid solutions, creep characteristics of which have been reported to be well rationalized as viscous glide creep, is analyzed using this equation. It is shown that stress dependence of d epsilon/dtsub(s) is well explained from the viewpoint of recovery, in which the activation and the annihilation of dislocations at sub-boundaries are considered to take place. (Atomindex citation 11:499218)

IPNO-T-78-05 PC **A09**/MF **A01**

Paris-11 Univ., Orsay (France). Inst. de Physique Nucleaire.

Study by Nuclear Techniques of the Impurity-Defect Interaction in Implanted Metals.

L. Thome. 1978, 198p

In French.Thesis.

U.S. Sales Only.

The properties of out equilibrium alloys formed by impurity implantation are strongly influenced by radiation damage created during implantation. This work presents a study, via hyperfine interaction and lattice location experiments, of the impurity-defect interaction in ion implanted metals. When the impurity and defect concentrations in the implanted layer are small, i.e. when impurities are uniformly recoil implanted in the whole crystal volume following a nuclear reaction (Aq In experiments), the impurity interacts with its own damage cascade. In this case, a vacancy is found to be trapped by a fraction of impurities during an athermal process. The value of this fraction does not seem to depend critically on impurity and host. When the impurity and defect concentrations are such that defect cascades interact, i.e. when impurities are implanted with an isotope separator (Fe Yb experiments), the observed impurity-vacancy (or vacancy cluster) interactions depend then strongly on the nature of impurity and host. An empirical relation, which indicates the importance of elastic effects, has been found between the proportion of impurities interacting with defects and the difference between impurity and host atom radii. At implantation temperature such that vacancies are mobile, the impurity-defect interaction depends essentially on vacancy migration. A model based on chemical kinetics has been developed to account for the variation with temperature of measured quantities. (Atomindex citation 11:495562)

IPP-9/29 MF **A01**

Max-Planck-Inst. fuer Plasmaphysik, Garching (Germany, F.R.).

Ion-Induced Electron Emission from Gold Surfaces.

F. Thum. Jun 79, 106p

In German.

U.S. Sales Only. Microfiche copies only.

The secondary electron emission due to impact of a variety of atomic, molecular and cluster ions on pure and contaminated gold surfaces was investigated with an ion-electron converter. The measured frequency distribution of the electron groups released in a single impact process was compared with a Polya distribution, from which the mean secondary electron yield was determined. The velocity dependence of the SE yield from pure gold surfaces shows marked deviations from theoretical predictions. The results with contaminated surfaces are comparable with the SE emission from insulators. The SE yield of one particle in a cluster ion or molecular ion is equal to the yield of an atomic ion of the same velocity. There are no nonlinear effects as in the emission of atoms in sputtering. The dependence of the SE yield on the atomic number Z sub 1 of the projectile ion shows continuous variation of the SE yield ranging over one order of magnitude, and so it is much stronger than for contaminated surfaces. Superposed on this Z sub 1 oszillation is a fine structure in keeping with the step by step filling of the electron shells in the periodic system. (Atomindex citation 11:495563)

JAERI-M-7997 PC **A02**/MF **A01**

Japan Atomic Energy Research Inst., Tokyo.

Simultaneous and Continuous Observations of Helium Bombarded Surfaces of Polycrystalline Molybdenum.

M. Saidoh, K. Sone, R. Yamada, and H. Ohtsuka. Nov 78, 17p

In Japanese.

U.S. Sales Only.

Simultaneous and continuous observations of 100 keV helium bombarded surfaces of polycrystalline molybdenum were made using a scanning electron microscope positioned on a beam line of the 400 kV Cockcroft-Walton type ion accelerator to study surface phenomena on the first wall of fusion reactors. In the pre-implanted target (to a fluence of 4.4 x 10 exp 17 He exp + /cm exp 2 at ambient room temperature) annealed, the transition from blistering to exfoliation evidently appears in 100 keV helium bombardment at ambient room temperature. Exfoliation of the surface layer occurs in a moment and blisters grow with irradiation dose in a short time. The process of exfoliation is discussed. (Atomindex citation 11:495550)

N80-25413/9 PC **A03**/MF **A01**

National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

Evaluation of the Stress Corrosion Cracking Resistance of Several High Strength Low Alloy Steels.

T. S. Humphries, and E. E. Nelson. May 80, 28p NASA-TM-78276

The stress corrosion cracking resistance was studied for high strength alloy steels 4130, 4340, for H-11 at selected strength levels, and for D6AC and HY140 at a single strength. Round tensile and C-ring type specimens were stressed up to 100 percent of their yield strengths and exposed to alternate immersion in salt water, salt spray, the atmosphere at Marshall Space Flight Center, and the seacoast at Kennedy Space Center. Under the test conditions, 4130 and 4340 steels heat treated to a tensile strength of 1240 MPa (180 ksi), H-11 and D6AC heat treated to a tensile strength of 1450 MPa (210 ksi), and HY140 (1020 MPa, 148 ksi) are resistant to stress corrosion cracking because failures were not encountered at stress levels up to 75 percent of their yield strengths. A maximum exposure period of one month for alternate immersion in salt water or salt spray and three months for seacoast is indicated for alloy steel to avoid false indications of stress corrosion cracking because of failure resulting from severe pitting.

N80-25415/4 PC **A03**/MF **A01**

IIT Research Inst., Chicago, IL. Materials Technology Div.

Thermal Fatigue and Oxidation Data of Oxide Dispersion-Strengthened Alloys.

K. E. Hofer, V. L. Hill, and V. E. Humphreys. Mar 80, 42p NASA-CR-159842, IITRI-M6001-82

Contract NAS3-17787

Thermal fatigue and oxidation data were obtained 24 specimens representing 9 discrete oxide dispersion-strengthened alloy compositions or fabricating techniques. Double edge wedge specimens, both bare metal and coated for each systems, were cycled between fluidized beds maintained at 1130 C with a three minute immersion in each bed. The systems included alloys identified as 262 in hardness of HRC 38; 264 in hardness of HRC 38, 40 and 43; 265 HRC 39, 266 of HRC 37 and 40; 754; and 956. Specimens in the bare condition of 265 HRC 39 and 266 HRC 37 survived 6000 cycles without cracking on the small radius of the double edge wedge specimen. A coated specimen of 262 HRC 38, 266 HRC 37 and 266 HRC40 also survived 6000 cycles without cracking. A duplicate coated specimen of 262 HRC 38 alloy survived 5250 cycles before cracks appeared. All the alloys showed little weight change compared compared to alloys tested in prior programs.

N80-25717/3 PC **A11**/MF **A01**

Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (Germany, F.R.). Inst. fuer Werkstoff-Forschung.

Linear-Elastic and Elastic-Plastic Fracture Mechanics of Structural Materials.

Thesis - Karlsruhe Univ.

D. Munz. Jul 79, 250p DFVLR-FB-79-31, ESA-TT-649

Textin German; English Summary. Report Will Also Be Announced as Translation (Esa-TT-649).

Methods used to describe linear elastic and elastic-plastic fracture mechanics are summarized. Results of measurements on aluminum and titanium alloys, and steels are used to discuss problems relating to the measurement, assessment, and range of application of the various characteristic parameters. It is shown that the applicability of linear elastic fracture mechanics is larger than was previously assumed. The J-integral method is emphasized.

N80-25718/1 PC **A06**/MF **A01**

European Space Agency, Paris (France).

Mechanical Modeling of Microstructural Instabilities in Cyclic Viscoplasticity at Variable Temperatures.

Ph.D Thesis.

G. Cailletaud. Mar 80, 111p ESA-TT-611, ONERA-NT-1979-6

Transl. into English of "Modelisation Mecanique d'Instabilites Microstructurales en Viscoplasticite Cyclique a Temperature Variable", Rept. Onera-NT-1979-6 Onera, Paris, 1979. Original Report in French Previously Announced as N80-23445.

Constitutive equations, in the framework of thermodynamics with internal variables, using phenomenological observations, are proposed and identified by tests involving isolated temperature changes. The model is successfully compared with simple tests and is used to predict the behavior of

the material under study when simultaneously subjected to mechanical and thermal cycling.

PAT-APPL-6-047 444 PC **A02/MF A01**
Department of Energy, Washington, DC.
Fe-Based Long Range Ordered Alloys.
Patent Application,
C. T. Liu. Filed 11 Jun 79, 12p
Contract W-7405-ENG-26
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Malleable long range ordered alloys with high critical ordering temperatures exist in the V(Co,Fe) sub 3 and V(Co,Fe,Ni) sub 3 system. The composition comprising by weight 22 to 23% V, 35 to 50% Fe, 0 to 22% Co and 19 to 40% Ni with an electron density no greater than 8.00. Excellent high temperature properties occur in alloys having compoations comprising by weight 22 to 23% V, 35 to 45% Fe, 0 to 10% Co, 25 to 35% Ni; 22 to 23% V, 28 to 33% Ni and the remainder Fe; and 22 to 23% V, 19 to 22% Co and the remainder Fe. The alloys are fabricable by casting, deforming and annealing for sufficient time to provide ordered structure. (ERA citation 05:024363)

PAT-APPL-6-048 332 PC **A02/MF A01**
Department of Energy, Washington, DC.
Method of Winning Aluminum Metal from Aluminous Ore.
Patent Application,
R. O. Loutfy, R. Keller, and N. P. Yao. Filed 14 Jun 79, 15p
Contract W-31-109-ENG-38
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Aluminous ore such as bauxite containing alumina is blended with coke or other suitable form of carbon and reacted with sulfur gas at an elevated temperature. For handling, the ore and coke can be extruded into conveniently sized pellets. The reaction with sulfur gas produces molten aluminum sulfide which is separated from residual solid reactants and impurities. The aluminum sulfide is further increased in temperature to cause its decomposition or sublimation, yielding aluminum subsulfide liquid (A1S) and sulfur gas that is recycled. The aluminum monosulfide is then cooled to below its disproportionation temperature to again form molten aluminum sulfide and aluminum metal. A liquid-liquid or liquid-solid separation, depending on the separation temperature, provides product aluminum and aluminum sulfide for recycle to the disproportionation step. (ERA citation 05:024361)

PAT-APPL-6-052 180 PC **A02/MF A01**
Department of Energy, Washington, DC.
Delta Ferrite-Containing Austenitic Stainless Steel Resistant to the Formation of Undesirable Phases Upon Aging.
Patent Application,
J. M. Leitnaker. Filed 26 Jun 79, 20p
Contract W-7405-ENG-26
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Austenitic stainless steel alloys containing delta ferrite, such as are used as weld deposits, are protected against the transformation of delta ferrite to sigma phase during aging by the presence of carbon plus nitrogen in a weight percent 0.015 to 0.030 times the volume percent ferrite present in the alloy. The formation of chi phase upon aging is controlled by controlling the Mo content. (ERA citation 05:024360)

PAT-APPL-6-149 051 PC **A02/MF A01**
Department of the Navy Washington DC
TiNi Base Alloy Shape Memory Enhancement through Thermal and Mechanical Processing.
Patent Application,
Frederick E. Wang, and William J. Buehler. Filed 12 May 80, 14p AD-D007 239/7
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A process for improving the shape change memory properties of a titanium-nickel base alloy by (1) heat treating the alloy to convert the TiNi phase to CsCl (B2)-type crystal structure, (2) cold working the alloy to increase the micro-twinning, and finally (3) thermal cycling the alloy through the transition temperature range (TTR) while a load is applied in order to improve the orientation of the micro-twins. (Author)

PATENT-4 175 954
Not available NTIS
Department of Energy, Washington, DC.
Self-Disintegrating Raney Metal Alloys.
Patent,
L. L. Oden, and J. H. Russell. Filed 24 Jul 78, patented 27 Nov 79, 6p PAT-APPL-927 235
Supersedes PAT-APPL-927 235-78.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A method is described for preparing a Raney metal alloy which is capable of self-disintegrating when contacted with water vapor. The self-disintegrating property is imparted to the alloy by incorporating into the alloy from 0.4 to 0.8 weight percent carbon. The alloy is useful in forming powder which can be converted to a Raney metal catalyst with increased surface area and catalytic activity. (ERA citation 05:024370)

PB80-194392 Not available NTIS
National Bureau of Standards, Washington, DC.
The Niobium (Columbium)-Palladium Constitution Diagram.
Final rept.,
B. C. Giessen, N. J. Grant, D. P. Parker, R. C. Manuszewski, and R. M. Waterstrat. May 80, 5p
Contract SD-90, Grant PHS-DE-05031
Sponsored in part by Office of Naval Research, Arlington, VA. Contract N14-76-C-820.
Pub. in Jnl. Metall. Trans. A 11A, p709-713 May 80.

The Nb-Pd system was investigated over the entire composition range by metallography and X-ray diffraction analysis. The solubility limits of terminal and intermediate phases and solidus temperatures were determined. Alpha-Nb dissolves approximately 36 at. pct Pd at. 1520C and approximately 20 at. pct Pd at 800C; alpha-Pd dissolves approximately 31 at. pct Nb at 1610C and approximately 18 at. pct Nb at temperatures below 1500C. The presence of three intermediate phases NbPd2 (MoPt2-type), alpha-NbPd3 (TiAl3-type), and beta-NbPd3 (beta-NbPd3-type) was confirmed; NbPd2 melts at 1610C and one of the NbPd3 phases transforms at the same temperature into alpha-Pd solid solution which melts at 1625C. In addition, an approximately equiatomic high-temperature phase alpha-NbPd with a homogeneity range of approximately 11 at. pct was found which melts at 1520 to 1565C and probably is an extension of and isomorphous with the alpha-Pd solid solution. Five three-phase reactions are described, and crystal chemical relationships are discussed.

PB80-809304 PC **N01/MF N01**
New England Research Application Center, Storrs, CT.
Steel Decarburization. 1970-April, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1970-Apr 80,
C. Gilbert Young. May 80, 192p
Sponsored in part by National Technical Information Service, Springfield, VA.

Cited works describe numerous decarburization processes abstracted from the world literature. Also included are discussions of analytic techniques used to study the effectiveness or physical extent of the decarburization. A number of applications for the use of decarburized steel are also included. (Contains 200 citations)

PB80-812308 PC **N01/MF N01**
New Mexico Univ., Albuquerque. Technology Application Center.
High Strength Aluminum Alloys. May, 1979-April, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for May 79-Apr 80,
Mary K. Gallagher. Jul 80, 35p
Supersedes NTIS/PS-79/0339. Sponsored in part by National Technical Information Service, Springfield, VA.

The cited articles from the international literature concern research on high strength aluminum alloys. Topics covered include mechanical properties, fracture strength, stress corrosion cracking, crack propagation, metal fatigue, precipitation hardening, and fatigue tests. (This updated bibliography contains 105 citations, 33 of which are new entries to the previous edition.)

PB80-812316 PC **N01/MF N01**
New Mexico Univ., Albuquerque. Technology Application Center.
Heat Resistant Nickel Alloys. 1977-April, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for 1977-Apr 80,
Mary K. Gallagher. Jul 80, 55p
Supersedes NTIS/PS-79/0338. Sponsored in part by National Technical Information Service, Springfield, VA.

This collection of abstracts from the international literature concerns research and development of heat resistant nickel alloys. Topics covered include the microstructure, mechanical properties, cast alloys, powder metallurgy, precipitation hardening, and heat treatment. (This updated bibliography contains 153 citations, 72 of which are new entries to the previous edition.)

SAND-79-2220 PC **A02/MF A01**
Sandia Labs., Albuquerque, NM.
Hydrostatic Stress Dependent Yield of 7075-T6 Aluminum.
S. E. Benzley, T. G. Priddy, and M. S. Soo Hoo.
Mar 80, 25p
Contract EY-76-C-04-0789

Tension and compression tests on notched cylindrical bars made of 7075-T6 aluminum have been conducted as a part of an investigation of the mechanics of ductile fracture. The compression tests showed significantly stiffer behavior in the nonlinear portion of the experiment than those found from the tension tests. This difference was accounted for by incorporating a hydrostatic stress dependent yield model in the analysis of the experiment. The model was verified by comparing finite element calculations with the actual experimental results. (ERA citation 05:022659)

Y-2196 PC **A03/MF A01**
Oak Ridge Y-12 Plant, TN.
Small-Specimen Fracture-Toughness Certification Techniques for 9 Nickel-4 Cobalt-0.20 Carbon Steel Forgings.
R. E. Oakes, Jr. Apr 80, 26p
Contract W-7405-ENG-26

Fracture-toughness certification is often needed for materials which are too thin for valid plane-strain fracture-toughness testing. In this work on 9 nickel-4 cobalt-0.20 carbon steel, the standard Charpy impact test is shown to have limited but - in some applications where only minimum toughness requirements must be met - useful capacity for identifying low-toughness material. Two J-integral test methods (the R-curve and a Single-Specimen technique) are demonstrated capable of fracture-toughness certification of this alloy over a broad toughness range using Charpy-size, precracked, slow-bend specimens. By use of a calibration relationship established in this work between plane-strain fracture toughness and J measured at maximum load, the Single-Specimen technique is simplified for application to production quantity testing. (ERA citation 05:022660)

11H. Oils, Lubricants, and Hydraulic Fluids

PAT-APPL-6-141 500 PC **A03/MF A01**
Department of the Air Force Washington DC
Analysis of Lubricating Oils for Iron Content.
Patent Application,
K. J. Eisentraut. Filed 18 Apr 80, 35p AD-D007 286/8
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

It is an object of this invention, therefore, to provide an improved method for determining the

quantity of iron wear metal present in lubricating oils in both particulate and dissolved forms. Other objects of the invention are: to provide a method for conducting a rapid, on-the-spot quantitative test for a major wear metal contained in lubricating oils; to provide apparatus, which may be in the form of a kit, for carrying out the quantitative analysis of iron in lubricating oils; and to provide articles of manufacture which incorporate components used in the practice of the analytical method of this invention.

11I. Plastics

AD-A085 350/7 PC **A03**/MF **A01**
Lowell Univ MA Dept of Chemistry
The Weathering of Plastic Materials in the Tropics. 3. The Evaluation of a Solar Radiation Concentration Device (EMMA) as a Means of Accelerating the Weathering of Plastics.
Jun 74, 35p DRIC-BR-68706
Errata sheet inserted.

This report gives details of a trial in Phoenix comparing the rate of natural weathering with that for exposure on EMMA - a device which increases the intensity of solar radiation. The materials exposed were low density polyethylene and polyacetal. An acceleration factor of about two was found for both materials. (Author)

AD-A085 359/8 PC **A02**/MF **A01**
Wisconsin Univ-Madison Dept of Chemistry
Novel Organosilicon Radical Cations. One-Electron Oxidation of Permethylcyclopolysilanes,
H. Bock, W. Kaim, M. Kira, and R. West. 27 Nov 78, 6p AFOSR-TR-80-0316
Grant AFOSR-78-3570
Pub. in Jnl. of the American Chemical Society, v101 p7667-7670 1979. Prepared in cooperation with Frankfurt Univ. (Germany, F.R.) Dept. of Chemistry.

No abstract available.

AD-A085 361/4 PC **A02**/MF **A01**
Texas Univ At Austin Dept of Chemistry
Effect of a Mercuric Sulfate Precolumn on Chloro Olefin Abstraction,
Donna Nelson, Michael J. S. Dewar, J. M. Buschek, and Edward McCarthy. 24 Apr 79, 7p
AFOSR-TR-80-0370
Grant AFOSR-79-0008
Pub. in Jnl. of Organic Chemistry, v44 n23 p4109-4113 1979. Prepared in cooperation with Allied Chemical Corp., Morristown, NJ.

No abstract available.

AD-A085 367/1 PC **A02**/MF **A01**
University of Southern California Los Angeles Dept of Chemistry
Mechanism of Reaction of Dimethylsilylene with Alpha, Beta-Unsaturated Epoxides,
Dongjaw Tzeng, and William P. Weber. 21 Sep 79, 2p AFOSR-TR-80-0330
Grants AFOSR-80-0006, AFOSR-77-3123
Pub. in Jnl. of the American Chemical Society, v102 p1451 1980.

No abstract available.

AD-A085 596/5 PC **A03**/MF **A01**
Air Force Wright Aeronautical Labs Wright-Patterson AFB OH
High Temperature Reactive Thermoplastic Aromatic Polyimides.
Final rept. Oct 78-Dec 79,
B. A. Reinhardt, and F. E. Arnold. Apr 80, 37p
Rept no. AFWAL-TR-80-4013

A series of high molecular weight aromatic enyne polyimides were prepared by the condensation of various aromatic dianhydrides with (E)-33'-(1-buten-3-ynylene) dianiline (I). The polymers were soluble in low boiling solvents and exhibited intrinsic viscosities as high as 0.7 with glass transition temperatures ranging from 200-265 C. The new thermoplastic materials have the capability to become lightly crosslinked when thermally treated during a stimulated high temperature thermoforming process. Thermal treatment diminishes the various solvent-induced problems inherent in linear polymeric materials, as well as advances the glass transition temperature. Copolymers were also prepared using 1,3-bis(amino-phenoxy) benzene and (I) in an effort to obtain various percentages of enyne along the polymer backbone and therefore control the degree of crosslinking. Selected copolymer compositions are currently being evaluated as thermoplastic composite materials with improved solvent resistance. (Author)

AD-A085 804/3 PC **A04**/MF **A01**
Case Western Reserve Univ Cleveland OH Dept of Macromolecular Science
Development of Hard Elastic Solids from Glassy Polymers.
Interim rept.,
Abdelsamie Moet, Igor Palley, and Eric Baer. 10 Jun 80, 56p Rept no. TR-10
Contract N00014-75-C-0795

High impact polystyrene (HIPS) has been processed into a specific microstructure which exhibited the hard elastic behavior previously restricted to crystalline polymers. Unidirectionally stacked profuse crazes formed in uniaxially elongated HIPS reproduced morphologies resembling the row nucleated structures of stacked lamellar aggregates bridged by extended fibrils. Films in this form possess repeated high recovery from large extension without rapture. Stress-Strain and stress-relaxation tests performed in air and in a variety of liquids in addition to thermoelastic experiments indicate that this novel material has identical characteristics to that of hard elastic crystalline polymers. The time-independent component of elastic recovery was found to be an energy driven process which originates largely from surface forces. Our results confirm that the recovery process of elastic HIPS, like crystalline systems, is composed of an instantaneous component in addition to time-dependent healing mechanism. The first was found to be energetic in nature whereas the second remained conformational (entropic). A structural model is presented which explains the observed mechanical and structural data. The model is based on the reversible extensive formation of fresh surface of the craze (or interlamellar) fibrillar material giving rise to the elastic restorative force. Time-dependent 'healing' stems from the conformational character maintained by the subfibrils. Stress-induced sorption and release of liquid, a newly discovered property, is also discussed. (Author)

IFTM-CS-1-1978 PC **A02**/MF **A01**
Institutul de Fizica si Tehnologia Materialelor, Bucharest (Romania).
Contributions to the Study of the Mechanically Generated Active Centers in Macromolecular Samples.
M. Chipara, and R. Baican. Oct 78, 23p
U.S. Sales Only.

Starting from the equation proposed by Zhurkhov and coevaluate the kinetic of the active centers, generated by mechanical stresses in macromolecular systems. The equations which describe the generation of the active centers are evaluated in few approximations, provided that the investigated systems satisfy the Hooke law, the Mark-Kuhn and Guth law or the phenomenological Mooney-Rivlin equation. Therefore, a correlation between the results obtained by the E.P.R. spectrometry and some macroscopical parameters concerning the elastical features of samples is suggested. In the case of rolled polymeric samples, satisfying the Mark-Kuhn and Guth model, an estimative determination of the active centers concentration is made and the results are compared with the experimental data. (Atomindex citation 11:495484)

PATENT-4 165 247 Not available NTIS
Department of the Navy Washington DC
Polyurethane Solid Propellant Binder.
Patent,
William R. Brew, and Raymond M. Price. Filed 9 Feb 66, patented 21 Aug 79, 5p AD-D007 255/3, PAT-APPL-526 663
Supersedes PAT-APPL-526 663-66.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

This invention pertains to solid propellants and more particularly to solid propellants of the composite type which contain a high energy plasticizer. One type of solid propellant which has been used in rocket motors is the so-called composite type and it generally comprises a solid oxidizer dispersed in an organic resin. In some cases it would be desirable to increase the impulse characteristics of these propellants by the use of a high ratio of energetic acidic plasticizer to organic resin but heretofore the use of such ratios has affected the compatibility of the propellant composition as evidenced by cure level, aging stability and plasticizer retention. Accordingly, it is an object of this invention to provide a solid propellant of a composite type containing a high energy acidic plasticizer. It is another object of this invention to provide a solid propellant which has a good plasticizer retention. It is a further object of this invention to provide a solid propellant with good aging stability. (Author)

PATENT-4 183 841 Not available NTIS
Department of the Navy Washington DC
Filled Composition Containing Phenol-Aldehyde Resin and Butadiene-Acrylonitrile Polymer.
Patent,
Rudolph J. Danowski. Filed 16 Jul 65, patented 15 Jan 80, 4p AD-D007 253/8, PAT-APPL-473 571
Supersedes PAT-APPL-473 571-65.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An improved char and erosion resistant ablative thermal insulator composition, which can be used for flexible combustion chambers which comprises: (a) 70-140 parts by weight of a phenolic-aldehyde resin; (b) 40-100 parts by weight of a filler selected from the group consisting of Group I and II metal phosphates, carbonates, acetates, oxalates and sulfites; and (c) 100 parts by weight of a butadiene-acrylonitrile polymer having an acrylonitrile content between about 20 and 45%. (Author)

PATENT-4 200 721 Not available NTIS
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
Heat Resistant Polymers of Oxidized Styrylphosphine.
Patent,
K. J. L. Paciorek. Filed 19 May 78, patented 29 Apr 80, 14p N80-24438/7, PAT-APPL-907 479
Supersedes PAT-APPL-907 479-78, N7825217 (16 - 16 p 2094) Sponsored by NASA.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

A flame resistant, nontoxic polymer which may be used safely in confined locations where there is inadequate ventilation is prepared either by polymerizing compounds having the formula R-N=P(C6H5)2(C6H4)CH=CH2 where R is an organic moeity selected from the group of (C6H5)2P(O)-, (C6H5O)2P(O)-, (C6H5)2 C3N3-, or their mixtures, or by reacting a polymer with an organic azide such as diphenylphosphinylazide, diphenyl-phosphorylazide, 2-azido-4,6-diphenly-5-triazine, 2,4-diazido-6-phenyl-s-triazine, trimethylsilyoazide, triphenylsilylazine, and phenylazine. The reaction of the styrylphosphine with the organozaide results in the oxidation of the trivalent phosphorus atom to the pentavalent state in the form of an unsaturated P=N linkage known as a phosphazene group.

PATENT-4 201 876 Not available NTIS
Department of the Air Force Washington DC
Fluorine Containing Polyethers.
Patent,
Warren R. Griffin. Filed 8 Dec 76, patented 6 May 80, 4p AD-D007 282/7, PAT-APPL-748 582
Supersedes PAT-APPL-748 582-76, AD-D003 387.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A fluorinated polyether is synthesized by (1) reacting perfluoroglutryl chloride and 1,5-hexafluoro-

pentane diol to provide a fluorinated polyester and (2) converting ester groups of the polyester to ether groups by SF4 reduction. The product obtained is a thermally stable polyether which is particularly useful in providing an elastomeric material for aircraft fuel tank sealants, tire valves, O-rings, hose, gaskets, and the like. (Author)

SAND-80-0523C PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Wind-Tunnel and Flight Tests of Ablators and Insulators for Rocket Vehicles.
R. E. Sheldahl, S. G. Beard, Jr., I. Auerbach, and T. F. Covert. Apr 80, 30p CONF-800502-12
Contract EY-76-C-04-0789
26. international instrumentation symposium, Seattle, WA, USA, 5 May 1980.

Many rocket vehicles, such as sounding rockets, can be flown without any thermal protection on the cylindrical payload or motor sections; however some high-performance rocket systems do experience enough aerodynamic heating aft of the nose cone to require thermal protection to keep the temperature of the structure below allowable limits. The material providing protection is usually a plastic, applied to the external skin of the vehicle, that protects the structure from excessive temperatures because of its low conductivity and/or ablative properties. This experimental study was motivated by a renewed interest in ablators and external insulator materials capable of protecting these structures. Ten materials to provide adequate protection and add minimum weight were identified and tested in a wind tunnel and on rocket vehicles. The thermal results of these tests are presented. (ERA citation 05:022725)

11K. Solvents, Cleaners, and Abrasives

PAT-APPL-6-140 640 PC **A02**/MF **A01**
Department of the Air Force Washington DC
A Solvent Mixture for Dissolving and Removing Epoxy Resinous Compounds.
Patent Application,
John L. Elwell, Jr. Filed 15 Apr 80, 8p AD-D007 287/6
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A solvent solution for dissolving and removing epoxy resinous formulations. The solution is composed of a mixture of methanol, dichloromethane and distilled water as essential components.

PB80-194418 Not available NTIS
National Bureau of Standards, Washington, DC.
Adhesive Bonding of Various Materials to Hard Tooth Tissues. XXII. The Effects of a Cleanser, Mordant, and PolySAC on Adhesion Between a Composite Resin and Dentin.
Final rept.,
R. L. Bowen. May 80, 6p
Grant PHS-DE-5129-01
See also report dated 1980, PB80-178825.
Pub. in Jnl. of Dental Research 59 n5 p809-814 May 80.

Preliminary evaluations on the effects of a cleanser, mordant, and polyfunctional surface-active comonomer on adhesion between a composite resin and dentin evinced that the ferric chloride mordant significantly improved bonding. The effects of the cleanser and coupling agent were also favorable, as were all of their interactions.

PB80-812290 PC **N01**/MF **N01**
New Mexico Univ., Albuquerque. Technology Application Center.
Abrasion, Abrasives, and Abrasion Resistance. 1972-April, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for 1972-Apr 80,
Mary K. Gallagher. Jul 80, 28p
Supersedes NTIS/PS-79/0340. Sponsored in part by National Technical Information Service, Springfield, VA.

The cited articles from the international literature concern abrasion, abrasives, and abrasion resistance. Topics covered include wear tests, the microstructure, mechanical and surface properties of metal surfaces, and protective coatings. (This updated bibliography contains 110 citations, 7 of which are new entries to the previous edition.)

12. MATHEMATICAL SCIENCES

12A. Mathematics and Statistics

AD-A084 746/7 PC **A04**/MF **A01**
Texas A and M Univ College Station Inst of Statistics
Data Modeling Using Quantile and Density-Quantile Functions.
Technical rept.,
Emanuel Parzen. Apr 80, 51p TR-B-2, ARO-16992.2-M
Contract DAAG29-80-C-0070

Statistical data modeling is a field of statistical reasoning that seeks to fit models to data without using models based on prior theory; rather one seeks to learn the model by a process which could be called statistical model identification. When analyzing a sample X sub 1, ..., X sub n, statisticians should not confine themselves to either fitting a Gaussian distribution, or transforming the data to be Gaussian. Such an approach ignores the importance of bimodality as a feature of observed data, and also ignores the need to fit to data probability model based distributions which could suggest probability models for the causes generating the data. This paper describes an approach to statistical data modeling which emphasizes estimation of quantile and density-quantile functions; it treats the Gaussian distribution as just one of the available distributions. (Author)

AD-A085 316/8 PC **A02**/MF **A01**
Naval Postgraduate School Monterey CA
A Mixed Exponential Time Series Model. NMEARMA(p,q).
Technical rept.,
A. J. Lawrance, and P. A. W. Lewis. Mar 80, 18p
Rept no. NPS55-80-012

A first-order stochastic difference equation with random coefficients is shown to have a solution which makes the marginal distribution of the stationary sequence generated by the equation a convex mixture of two exponential distributions. This Markovian process should be broadly applicable in stochastic modelling in operations analysis. Moreover it can be extended quite simply to a mixed exponential process with mixed pth-order autoregressive and qth-order moving average correlation structure. Coupling of the processes to model multivariate situations is also discussed. (Author)

AD-A085 319/2 PC **A03**/MF **A01**
Illinois Univ At Urbana-Champaign Applied Computation Theory Group
Plane-Sweep Algorithms for Intersecting Geometric Figures,
J. Nievergelt, and F. P. Preparata. Oct 79, 26p
Rept nos. ACT-18, UILU-ENG-78-2256
Contract N00014-79-C-0424, Grant NSF-MCS78-13642
Also available as Rept. no. R-863.

This report considers various types of geometric figures in the plane defined by points connected by straight line segments, such as polygons (not necessarily simple) and maps (embedded planar graphs); and the problem of computing the intersection of such figures by means of a 'greedy' type of algorithm that sweeps the plane unidirectionally. Let n be the total number of points of all the figures involved, and s the total number of intersections of line segments. It is shown in the general case (no convexity) a previously known algorithm can be extended to compute in time O((n+s)logn) and space O(n+s) all the connected regions into which the plane is divided by intersecting the figures. When the regions of each figure are convex, the same can be achieved in time O(niogn+s) and space O(n).

AD-A085 335/8 MF **A01**
Washington Univ Seattle Dept of Mathematics
Duality in Optimal Control,
R. T. Rockafellar. 1978, 39p AFOSR-TR-80-0296
Grant AFOSR-77-3204
Pub. in Mathematical Control Theory, Lecture Notes in Math, n680 p219-257 1978.
Availability: Microfiche copies only.

No abstract available.

AD-A085 337/4 PC **A03**/MF **A01**
Brown Univ Providence RI Div of Applied Mathematics
Spline Approximations for Functional Differential Equations,
H. T. Banks, and F. Kappel. 3 Oct 78, 30p
AFOSR-TR-80-0293
Grants AFOSR-76-3092, NSF-GP-28931
Pub. in Jnl. of Differential Equations, v34 n3 p496-522 Dec 79.

No abstract available.

AD-A085 341/6 PC **A02**/MF **A01**
Louisiana State Univ Baton Rouge Dept of Electrical Engineering
Synthesis of Polynomic Systems,
William A. Porter. 20 Mar 78, 9p AFOSR-TR-80-0374
Grant AFOSR-78-3500
Pub. in SIAM Jnl. of Mathematical Analysis, v2 n2 p308-315 Mar 80.

No abstract available.

AD-A085 376/2 PC **A02**/MF **A01**
Stanford Univ CA Dept of Electrical Engineering
Review of 'Factorization Methods for Discrete Sequential Estimation' -- Gerald J. Bierman,
Thomas Kailath. 1979, 3p ARO-16946.5-M
Contracts DAAG29-79-C-0215, F49620-79-C-0058
Pub. in IEEE Transactions on Information Theory, vIT-26 n1 p130-131 Jan 80.

No abstract available.

AD-A085 379/6 MF **A01**
Minnesota Univ St Paul Dept of Applied Statistics
Fisher's Contributions to the Analysis of Categorical Data,
Stephen E. Fienberg, and D. V. Hinkley. 1980, 6p
Contract N00014-78-C-0600
Availability: Microfiche copies only.

No abstract available.

AD-A085 387/9 PC **A03**/MF **A01**
Florida Univ Gainesville Center for Mathematical System Theory
Linear Systems Over Commutative Rings: A Survey,
E. D. Sontag. 2 Sep 75, 36p AFOSR-TR-80-0343
Grants AFOSR-76-3034, DAAG29-76-G-0203
Pub. in Ricerche di Automatica, v7 n1 p1-34 Jul 76.

No abstract available.

AD-A085 416/6 Not available NTIS
Southern Methodist Univ Dallas TX Dept of Statistics
A New Approach to Testing Goodness of Fit for Censored Samples,
John R. Michael, and William R. Schucany. Dec 77, 7p
Contract N00014-75-C-0439
Prepared in cooperation with Bell Telephones Labs., Inc., Holmdel, NJ. Presented at the Technometrics Session of the Annual Fall Technical Conference of the Chemical Division of the ASQC (23rd), Minneapolis, MN 1-2 Nov 79.
Availability: Pub. in Technometrics, v21 n4 p435-441 Nov 79 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A085 575/9 PC **A02**/MF **A01**
Harry Diamond Labs Adelphi MD
Invertible Binary Matrices.
Technical memo.,
Thomas C. Jedrey. May 80, 14p Rept no. HDL-TM-80-13

In an alternative approach to digital network synthesis, M.G. Karpovsky (1976) presents an algorithm that minimizes the number of nonzero coefficients in a Haar expansion of a Boolean function.

In this algorithm, an invertible modulo two matrix must be generated subject to certain constraints. Two algorithms are presented that can generate this matrix. A simple method of generating invertible modulo two matrices is also presented. (Author)

AD-A085 593/2 PC **A02**/MF **A01**
Southern Methodist Univ Dallas TX Dept of Statistics
The Influence Curve and Goodness of Fit.
Technical rept.,
John R. Michael, and William R. Schucany. 9 May 80, 24p Rept no. TR-137
Contract N00014-75-C-0439

The influence curve introduced by Hampel (1968) is applied to goodness-of-fit statistics. The efficacy curve is then defined to be the square of influence curve weighted by a constant which arises in the context of approximate Bahadur efficiency. For a number of goodness-of-fit statistics the ratios of these curves are shown to be equal to the asymptotic relative efficiency in the Pitman sense when testing for point contamination. These efficacy curves graphically demonstrate the sensitivities of certain goodness-of-fit statistics to minor perturbations in the assumed distribution. (Author)

AD-A085 616/1 PC **A02**/MF **A01**
Kansas Univ Lawrence Dept of Mathematics
Optimal Control of Stochastic Systems in a Sphere Bundle,
T. E. Duncan. 1978, 12p AFOSR-TR-80-0410
Grants AFOSR-77-3177, NSF-ENG75-06562
Pub. in Measure Theory Applications to Stochastic Analysis, Lecture Notes in Mathematics, v695 p51-61 1978.

No abstract available.

AD-A085 731/8 PC **A02**/MF **A01**
College of William and Mary Williamsburg VA
Which Reconstruction Results are Significant.
Technical rept.,
Paul K. Stockmeyer. May 80, 16p Rept no. TR-19
Contract N00014-76-C-0673
Presented at the International Conference on the Theory and Applications of Graphs (4th), Kalamazoo, MI.

One of the most famous unsolved problems in graph theory is the Reconstruction Conjecture, formulated nearly forty years ago by P. J. Kelly and/or S. M. Ulam. Well over one hundred papers have been written on the conjecture, including excellent survey articles by Bondy and Hemminger (1) and by Nash-Williams (10). (Author)

AD-A085 741/7 MF **A01**
Wisconsin Univ-Madison Dept of Statistics
Bounds for Optimal Confidence Limits for Series Systems.
Technical rept.,
Bernard Harris, and Andrew P. Soms. May 80, 11p Rept no. UWIS-DS-80-611
Contracts N00014-79-C-0321, DAAG29-75-C-0024
Availability: Microfiche copies only.

Lindstrom-Madden type approximations to the lower confidence limit on the reliability of a series system are theoretically justified by extending and simplifying the results of Sudakoc (1973). Applications are made to Johns (1976) and Winterbottom (1974). Numerical examples are presented. (Author)

AD-A085 746/6 PC **A02**/MF **A01**
College of William and Mary Williamsburg VA Dept of Mathematics
Pseduosimilar Vertices in a Graph.
Technical rept.,
Robert J. Kimble, Jr., Allen J. Schwenk, and Paul K. Stockmeyer. Jan 80, 19p Rept no. TR-18
Contract N00014-76-C-0673, Grant NSF-MCS79-01984

Dissimilar vertices whose removal leaves isomorphic subgraphs are called pseudosimilar. We construct infinite families of graphs having identity automorphism group, yet every vertex is pseudosimilar to some other vertex. Potential impact on the Reconstruction Conjecture is considered. We also construct, for each n, graphs containing a subset of vertices of size n which are mutually pseudosimilar. The analogous problem for mutually pseudosimilar edges is introduced. (Author)

AD-A085 762/3 PC **A04**/MF **A01**
Illinois Univ At Urbana-Champaign Decision and Control Lab
Design of Optimally Robust Control Systems.
Master's thesis,
Christine Barbara Chato. Jan 80, 60p Rept nos. DC-34, UILU-ENG-80-2202
Contract N00014-79-C-0424
Also available as rept. no. R-870.

This thesis develops an approach to the design of constant output feedback controllers for linear systems which incorporates many common approaches. It is assumed that some of the design criteria can be represented as restrictions on the locations of the closed-loop system eigenvalues in the complex plane. Additional constraints are represented by a quadratic cost function. The design problem is then to choose a set of constant output feedback gains that minimize the cost function subject to the constraints. (Author)

AD-A085 763/1 PC **A04**/MF **A01**
Illinois Univ At Urbana-Champaign Decision and Control Lab
Hierarchical Computation of Gains for the Decentralized Linear Quadratic Regulator Problem.
Master's thesis,
John Victor Pietras. Jan 80, 54p Rept nos. DC-35, UILU-ENG-80-2203
Contract N00014-79-C-0424
Also available as Rept. no. R-871.

The subject of this report is the application of a hierarchical computation structure to the computation of fixed decentralized state feedback gains for the regulation of linear systems with fixed (but arbitrary) dimension. This category of control problems encompasses many practical examples. In addition to those cases where the system is naturally linear, this framework extends to those nonlinear problems that can be characterized (via linearization) as linear systems driven by white noise. The decomposition technique that is utilized is that of interaction prediction. As will be shown, this particular method has the desirable characteristic of minimal computations at the supremal level. Because of the limitation of information available for feeding back under the decentralized control structure, the determination of the optimal feedback gains is dependent upon the (expected) values of the initial conditions. Thus the control which is derived is open loop. Although extensions to the basic methodology exist for forming closed loop controllers, the approach used here is totally off-line calculation of the closed loop optimal gains. (Author)

AD-A085 784/7 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
The Planck Integral Cannot be Evaluated in Terms of a Finite Series of Elementary Functions.
Journal article,
Richard Pavelle. 7 Aug 79, 3p JA-5010, ESD-TR-80-11
Contract F19628-80-C-0002
Pub. in Jnl. of Mathematical Physics, v21 n1 p14 Jan 80.

No abstract available.

BNL-27011 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
High Order Time Stepping Methods for Nonlinear Evolution Equations.
J. E. Pasciak. 1980, 16p CONF-800625-1
Contract EY-76-C-02-0016
International symposium on innovative numerical analysis in applied engineering science, Montreal, Canada, 16 Jun 1980.

Many important engineering problems require the time evolution of nonlinear processes. There are many methods in the literature for approximating homogeneous linear evolution equations that are unconditionally stable and take advantage of sparsity structure. This paper demonstrates how to derive high-order time approximation procedures for certain nonlinear evolution equations based on a given high-order approximation procedure for the homogeneous linear problem. For L a fixed differential operator, nonlinear evolution equations of the form u/sub t/ + Lu = J(u) are considered where J(u) is a nonlinear function of u. A stable and high-order algorithm for approximating the linear problem v/sub t/ + Lv = 0 is assumed to be given. This paper shows how to use the approximation algorithm to get high-order approximation for the evaluation equation. The results of computational experiments are given which illustrate the benefits of the time stepping methods. The Korteweg-de Vries equation and a nonlinear Schroedinger equation are considered. The spatial discretization is given by the spectral method with trigonometric polynomials (Fourier method). 2 figures, 1 table. (ERA citation 05:023383)

LA-8292-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Effect of Model Choice and Sample Size on Statistical Tolerance Limits.
B. S. Duran, and K. Campbell. Mar 80, 50p
Contract W-7405-ENG-36

Statistical tolerance limits are estimates of large (or small) quantiles of a distribution, quantities which are very sensitive to the shape of the tail of the distribution. The exact nature of this tail behavior cannot be ascertained brom small samples, so statistical tolerance limits are frequently computed using a statistical model chosen on the basis of theoretical considerations or prior experience with similar populations. This report illustrates the effects of such choices on the computations. (ERA citation 05:020622)

NUREG/CR-1401 PC **A05**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Estimators for the Binomial Failure Rate Common Cause Model,
Corwin L. Atwood. Apr 80, 86p EGG-EA-5112

In Vesely's binomial failure rate model, a system of m components is hit by random shocks which may cause components simultaneously to fail, each component with equal probability. Individual components may also fail when no shock has occurred. The data possibilities considered are that causes of single failures are identifiable (as shock or not) or not identifiable. Given data from such a system, non-Bayesian and Bayesian point and interval estimators are found for the various quantities of interest. Residual analyses and hypothesis tests are presented for checking the model assumptions. An example is worked out. The results are applied to some of the boiling water nuclear reactor control rod data given by Vesely.

N71-72076/7 PC **A07**/MF **A01**
Michigan Univ., Ann Arbor. Office of Research Administration.
Similarity Analyses of Partial Differential Equations.
Final rept.,
Tsung-Yen Na, Douglas E. Abbott, and Arthur G. Hansen. Mar 67, 132p 07457-17-F
Contract NAS8-20065
Prepared in cooperation with Michigan Univ., Dearborn. Div. of Engineering, Purdue Univ., Lafayette, IN., and Georgia Inst. of Tech., Atlanta.

Methods for transforming partial differential equations into forms more suitable for analysis and solution are investigated. The idea of a Generalized Similarity Analysis is introduced and results applied to the equations of boundary-layer flow. A thorough presentation of the application of continuous transformation groups to the problem of similarity analyses (reduction of the number of independent variables of an equation) is given with new and very general methods evolved for determining the nature of transformations.

N80-25694/4 PC **A02**/MF **A01**
Saab-Scania, Linkoping (Sweden).
Some Aspects on Improvments of a First-Order Dynamic Optimization Algorithm.
B. Jaermark. 1980, 20p SAAB-TN-AE-73

Several devices concerning improvement of a first order differential dynamic programming method

are discussed. These were tested and appear to be useful on optimal flight trajectory applications. Some convergence difficulties are due to instability in the differential equations or different sensitivity in the control within different time intervals. In order to reduce these difficulties, steps are taken by way of special choice of the penalty term in an earlier established convergence control parameter technique. To obtain better accuracy and stability when approaching or when close to optimum solution, a simplified second order algorithm is discussed. A first order method is suggested for free terminal time.

N80-26086/2 PC **A09/MF A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Suboptimal Approximations for Control in Optimal Dynamic Programs Aproximacoes sub-Otimas Para O Controle Em Programas Dinamicos de Otimizacao.
M.S. Thesis.
D. C. Ceballos. Feb 80, 187p INPE-1676-TDL/019
Text Portugese; English Summary.

A method for the numerical solution of suboptimal control problems is described in which the control is taken as a functional dependent on time and a finite number of parameters. In order to test the method, a computer program was developed with the capacity to solve a highly important group of optimization problems, requiring only two subprograms to be supplied. One of them embodies the dynamical equations of motion and the other is the partial differential of the constraints and the performance index equations with respect to final time and state vector. Applying the procedure to an Earth-Mars or orbit transfer problem, tests are made for various approximations of the control. For the previous problem a comparison is presented, relating the results obtained to the numerical optimal solution and to results from suboptimal procedures found in the literature.

N80-26087/0 PC **A02/MF A01**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
Application of Functional Analysis to Perturbation Theory of Differential Equations.
V. M. Bogdan, and V. B. Bond. May 80, 22p
NASA-TM-81073, JSC-16507

The deviation of the solution of the differential equation y' = f(t, y), y(O) = y sub O from the solution of the perturbed system z' = f(t, z) + g(t, z), z(O) = z sub O was investigated for the case where f and g are continuous functions on I x R sup n into R sup n, where I = (o, a) or I = (o, infinity). These functions are assumed to satisfy the Lipschitz condition in the variable z. The space Lip(I) of all such functions with suitable norms forms a Banach space. By introducing a suitable norm in the space of continuous functions C(I), introducing the problem can be reduced to an equivalent problem in terminology of operators in such spaces. A theorem on existence and uniqueness of the solution is presented by means of Banach space technique. Norm estimates on the rate of growth of such solutions are found. As a consequence, estimates of deviation of a solution due to perturbation are obtained. Continuity of the solution on the initial data and on the perturbation is established. A nonlinear perturbation of the harmonic oscillator is considered a perturbation of equations of the restricted three body problem linearized at libration point.

N80-26088/8 PC **A07/MF A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Mathematical Methods in Physics: Tensor Analysis 3 Metodos Mathematicos DA Fisica: 3 Analise Tensorial.
R. A. Medrano-b.. Dec 79, 150p INPE-1648-RPE/102-REV
Text in Portugese; English Summary. Revised.

An introduction to the study of tensors is presented. A treatment of Cartesian tensors is initiated with the derivation of the transformation relations for the components of a vector, through successive angular rotations of an orthogonal system of coordinates (Euler angles). Tensors of higher order are defined by means of the transformation relations of dyadics. The concept of covariant and contravariant tensors is coordinated. Some emphasis is placed on the geometric meaning of the fundamental tensor. Among other important concepts developed are: the contraction, relative tensors, the quotient theorem, Christoffel symbols, and the covariant derivative. Three applications on geodesics, Einstein's gravitational law, and the relativistic form of the Maxwell equations are presented. Whenever possible, illustrative examples are included.

N80-26089/6 PC **A04/MF A01**
Mississippi State Univ., Mississippi State. Dept. of Mathematics.
A Comparison of Finite Difference Methods for Solving Laplace's Equation on Curvilinear Coordinate Systems.
M.S. Thesis.
M. J. Mccoy. 25 Jun 80, 54p NASA-CR-163236
Grant NSG-1577

Various finite difference techniques used to solve Laplace's equation are compared. Curvilinear coordinate systems are used on two dimensional regions with irregular boundaries, specifically, regions around circles and airfoils. Truncation errors are analyzed for three different finite difference methods. The false boundary method and two point and three point extrapolation schemes, used when having the Neumann boundary condition are considered and the effects of spacing and nonorthogonality in the coordinate systems are studied.

N80-26098/7 PC **A02/MF A01**
Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
Synchronization of Weakly Coupled Relaxation Oscillators.
M. J. W. Jansen. Jul 78, 24p MC-TW-180/78

Existence and approximation problems for periodic solutions of a system of weakly coupled relaxation oscillators are reduced to an algebraic problem. The starting point is a theorem by Mishchenko on periodic solutions of certain singularly perturbed ordinary differential equations. The results obtained are then used to prove some theorems relating to mutually synchronized relaxation oscillations as prototypes of oscillating systems in biology.

N80-26099/5 PC **A02/MF A01**
Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Pure Mathematics.
Some Convexity Properties of Euler's gamma Function.
J. Vandelune. May 78, 16p MC-ZW-105/78

Various convexity properties related to Euler's gamma function are discussed. Most of the properties are generalizations of monotonic approximation theorems for integrals. The theorems are developed and proofs are given.

SAND-80-8627 PC **A03/MF A01**
Sandia Labs., Livermore, CA.
Error Estimates for Piecewise Perturbation Series Solutions of Parabolic and Hyperbolic Equations.
M. D. Smooke. Mar 80, 44p
Contract EY-76-C-04-0789

By approximating the time derivative operators of a set of one-dimensional, linear, parabolic, and hyperbolic mixed initial-boundary-value problems by appropriate difference expressions, the problems can be reduced to two-point boundary-value problems at chosen time levels. The piecewise perturbation series error analysis techniques developed in an earlier paper can then be applied. The aim of this analysis is to obtain high-order approximations with respect to the space discretization by use of a given time discretization. (ERA citation 05:021459)

12B. Operations Research

AD-A085 315/0 PC **A02/MF A01**
Illinois Univ At Urbana-Champaign Applied Computation Theory Group
A Lower Bound for On-Line One-Dimensional Bin Packing Algorithms.
Technical rept.,
Donna J. Brown. Dec 79, 24p Rept nos. ACT-19, UILU-ENG-78-2257
Contract N00014-79-C-0424
Also available as Rept. no. R-864.

This paper is concerned with algorithms for which the pieces (numbers) in list L are available one at a time, and each piece must be placed in some bin before the next piece is available; such an algorithm is referred to as on-line. The performance measure used is the ratio of the number of bins used by an algorithm A in packing list L, A(L), to the optimum (minimum) number of bins required to pack the list, OPT(L).

AD-A085 458/8 PC **A02/MF A01**
Georgia Inst of Tech Atlanta School of Industrial and Systems Engineering
An Algorithm for Linearly Constrained Nonlinear Programming Problems.
Interim rept.,
Mokhtar S. Bazaraa, and Jamie J. Goode. 1980, 23p AFOSR-TR-80-0449
Contract F49620-79-C-0120

In this paper an algorithm for solving a linearly constrained nonlinear programming problem is developed. Given a feasible point, a correction vector is computed by solving a least distance programming problem over a polyhedral cone defined in terms of the gradients of the 'almost' binding constraints. Mukai's approximate scheme for computing step sizes is generalized to handle the constraints. This scheme provides as estimate for the step size based on a quadratic approximation of the function. This estimate is used in conjunction with Armijo line search to calculate a new point. It is shown that each accumulation point is a Kuhn-Tucker point to a slight perturbation of the original problem. Furthermore, under suitable second order optimality conditions, it is shown that eventually only one trial is needed to compute the step size. (Author)

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

13A. Air Conditioning, Heating, Lighting, and Ventilating

AD-A085 355/6 PC **A03/MF A01**
New Mexico Engineering Research Inst Albuquerque
Heating Techniques for Asphalt/Aggregate Mixtures.
Final rept. Mar-Nov 79,
V. Cassino. Dec 79, 36p NMERI-AP-33, AFESC/ESL-TR-80-02
Contract F29601-76-C-0015

This report investigates conventional and recently developed equipment and methods used in the heating and mixing of asphalt/aggregate mixtures. Recommendations are made for techniques to be developed which will meet the rapid repair time that is specified. Microwave, solar, and conventional heating equipment is examined to determine the most feasible method to pursue for rapid heating and fuel conservation. (Author)

AD-A085 487/7 PC **A99/MF A01**
Foreign Technology Div Wright-Patterson AFB OH
Thermal Design of Boiler Unit (Standard Method).
29 Apr 80, 618p Rept no. FTD-ID(RS)T-0411-80
Unedited machine trans. of mono. Teplovoy Raschet Kotel'nykh Agregatov (Normativnyy Metod), publishing house Gosudarstvennoye Energeticheskoye, Moscow, Leningrad, 1957 p1-233.

No abstract available.

ALO-4135-T2 PC **A02/MF A01**
Ueland and Junker, Philadelphia, PA.
Solar Atrium: A Hybrid Solar Heating and Cooling System. Technical Progress Report No. 9, September 19, 1979-December 19, 1979.
28 Dec 79, 11p
Contract EG-77-G-04-4135

A program of applied research has been developed for the design, construction and monitoring

of an inovative concept of solar heating and cooling called solar atrium. The solar atrium concept is adeptable to residences and smaller commercial and institutional buildings. It is designed to be constructed of materials and equipment that are economical and readily available. Cost-effectiveness of installation and operation is a primary design objective. Progress in construction and instrumentation is listed. (ERA citation 05:022151)

BNL-27383 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Ground Coupled Solar Heat Pump Research Program in the United States.
P. D. Metz. 1980, 4p CONF-800451-1
Contract EY-76-C-02-0016
Annual heat pump technology conference, Stillwater, OK, USA, 14 Apr 1980.

The ground coupling research program funded by the Systems Development Division of the Office of Solar Applications of the US Department of Energy studies the use of the earth as a heat source/sink or storage element for solar heat pump space conditioning systems. The goal of this research program is to determine the feasibility of ground coupling, and if feasibility is confirmed, to create handbooks which facilitate widespread application of ground coupling. The research program is outlined and the research projects currently in progress and how they fit into the program are described. Progress toward the program goal is evaluated. (ERA citation 05:022241)

CONF-7805138-P1 PC **A13**/MF **A01**
Texas Univ. at Arlington.
Earth-Covered Buildings: Technical Notes.
F. L. Moreland, F. Higgs, and J. Shih. 1978, 287p
Contract W-7405-ENG-26
Earth covered settlements, Fort Worth, TX, USA, 17 May 1978.

John Cable, Architectural and Engineering Systems Branch, Division of Buildings and Community Systems, Department of Energy, kicked off the conference and spelled out the role of DOE in this area. One of his points was that the technical problems are easier than the institutional problems. A separate abstract was prepared for each of the 18 papers of this volume; all of the abstracts will appear in Energy Research Abstracts (ERA), and 16 were selected for Energy Abstractss for Policy Analysis (EAPA). (ERA citation 05:019222)

CONF-800438-1 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Earth Integrated Design: Office Dormitory Facility.
H. B. Shapira, and P. R. Barnes. 1980, 21p
Contract W-7405-ENG-26
Earth sheltered housing conference and exhibition, Minneapolis, MN, USA, 9 Apr 1980.

The generation process of the design of the Joint Institute for Heavy Ion Research is described. Architectural and energy considerations are discussed. The facility will contain living quarters for guest scientists who come to Oak Ridge to conduct short experiments and sleeping alcoves for local researchers on long experimental shifts as well as office space. (ERA citation 05:022182)

CONF-800449-1 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Passive Solar Heating and Natural Cooling of an Earth-Integrated Design.
P. R. Barnes, and H. B. Shapira. 1980, 6p
Contract W-7405-ENG-26
National technical conference - earth sheltered building design innovations, Oklahoma City, OK, USA, 18 Apr 1980.

The Joint Institute for Heavy Ion Research is being designed with innovative features that will greatly reduce its energy consumption for heating, cooling, and lighting. A reference design has been studied and the effects of extending the overhang during summer and fall, varying glazing area, employing RIB, and reducing internal heat by natural lighting have been considered. The use of RIB and the extendable overhang increases the optimum window glazing area and the solar heating fraction. A mass-storage wall which will likely be included in the final design has also been considered. A figure of merit for commercial buildings is the total annual energy consumption per unit area of floor space. A highly efficient office building in the Oak Ridge area typically uses 120 to 160 kWhr/m exp 2 . The Joint Institute reference design with natural lighting, an annual average heat pump coefficient of performance (COP) equal to 1.8, RIB, and the extendable overhang uses 71 kWhr/m exp 2 . This figure was determined from NBSLD simulations corrected for the saving from RIB. The internal heat energy from lighting and equipment used in the simulation was 1653 kWhrs/month (high natural lighting case) which is much lower than conventional office buildings. This value was adopted because only a portion of the building will be used as office space and efforts will be made to keep internal heat generation low. The mass-storage wall and ambient air cooling will reduce energy consumption still further. The combined savings of the innovative features in the Joint Institute building are expected to result in a very energy efficient design. The building will be instrumented to monitor its performance and the measured data will provide a means of evaluating the energy-saving features. The efficiency of the design will be experimentally verified over the next several years. (ERA citation 05:022183)

COO-4520-1 PC **A07**/MF **A01**
Colorado State Univ., Fort Collins. Solar Energy Applications Lab.
Cost-Effective Ways to Improve the Fabrication and Installation of Solar Heating and Cooling Systems for Residences. Final Report, June 1, 1977-September 30, 1978.
S. B. Thayer, P. Jacobs, and N. Weaver. Oct 78, 134p
Contract EG-77-S-02-4520

A Colorado State University Solar Energy Applications Laboratory study investigating cost-effective ways of improving fabrication and installation of residential solar energy heating systems is documented. The study entailed on-site observation of twelve installations focusing on the phase of mounting and manifolding of solar collectors. Time lapse photography and work measurement techniques were employed to record these installations. Generic collector types studied included air and liquid panels both internally and externally manifolded. Principal findings of the study synthesized from field observations, analysis of photographic data, time studies, and discussion with installation personnel and manufacturers' representatives are presented in the technical report. (ERA citation 05:020366)

DOE/CS-0149 PC **A03**/MF **A01**
Department of Energy, Washington, DC.
Status of the Weatherization Assistance Program Annual Report for 1979.
Feb 80, 39p

The DOE Weatherization Assistance Program is the major provider of Federal weatherization assistance. The status report concentrates on the three areas of concern relating to weatherization activities: the extent of progress being made toward achievement of national energy conservation goals; the adequacy and costs of materials; and the need for and desirability of modifying weatherization activities (and any changes to the legislation necessary to accomplish these modifications), and of extending such activities to a broader range of income groups. Other programs in the FmHA, HUD, and HEW are discussed for their historic importance or their present or potential contribution to weatherization activities. (ERA citation 05:020776)

DOE/ET/14851-1 PC **A02**/MF **A01**
Institute of Gas Technology, Chicago, IL.
Development of Combustion Data to Utilize Low-Btu Gases as Industrial Process Fuels: Modification of Flame Characteristics. Project 61041 Quarterly Report, October 1-December 31, 1979.
R. T. Waibel. Feb 80, 7p
Contract AC01-79ET14851

This program consists of an experimental program to determine the burner modifications that will yield suitable flame characteristics and shapes with oxygen-blown gases manufactured from coal. Experiments will also be conducted to evaluate methods of enhancing the flame characteristics of manufactured gases from air-blown gasifiers. Progress to date includes design of, and requesting quotations on, the oxygen-enrichment piping, preparation of the furnace for the trials, and discussions of the combustion trials with the burner manufacturer. (ERA citation 05:021722)

DOE/NASA/CR-161413 PC **A08**/MF **A01**
Florida Solar Energy Center, Cape Canaveral.
Solar Heating and Cooling Demonstration Project at the Florida Solar Energy Center.
J. D. Hankins. Feb 80, 173p
Contracts EG-77-A-01-4074, EX-76-A-29-102

The retrofitted solar heating and cooling system installed at the Florida Solar Energy Center is described. Information is provided on the system's test, operation, controls, hardware and installation, including detailed drawings. The Center's office building, approximately 5000 square feet of space, with solar air conditioning and heating as a demonstration of the technical feasibility is located just north of Port Canaveral, Florida. The system was designed to supply approximately 70% of the annual cooling and 100% of the heating load. The project provides unique high-temperature, nonimaging, non-tracking, evacuated-tube collectors. The design of the system was kept simple and employs five hydronic loops. They are energy collection, chilled water production, space cooling, space heating and energy rejection. (ERA citation 05:022186)

DSE-5255-T1 PC **A04**/MF **A01**
Environmental Law Inst., Washington, DC.
Building Codes as Barriers to Solar Heating and Cooling of Buildings.
F. O. Meeker, III. Apr 78, 51p
Contract EM-78-C-01-5255

The application of building codes to solar energy systems for heating and cooling of buildings is discussed, using as typical codes the three model building codes most widely adopted by states and localities. Some potential barriers to solar energy systems are found, federal and state programs to deal with these barriers are discussed, and alternatives are suggested. To remedy this, a federal program is needed to encourage state adoption of standards and acceptance of certification of solar systems for code approval, and to encourage revisions to codes based on model legislation prepared for the federal government by the model codes groups. (ERA citation 05:018558)

EPRI-ER-1282-SR PC **A05**/MF **A01**
Electric Power Research Inst., Palo Alto, CA.
Manual and Programmable Calculator Methods for Sizing Solar Energy Systems.
R. S. Barlow. Dec 79, 79p

The important characteristics, features, and limitations of manual methods and programmable calculator software for sizing active or passive solar energy systems and predicting their performance are described. The intent is to provide utilities with useful information that will facilitate sound choices of solar calculation methods to be used in responding to the National Energy Act. The major issues relating to manual solar calculation methods are discussed. General information on each method is given in easily used matrices. Critical reviews, as well as sources and costs, are given in a one-page summary for each method. Throughout the text, an effort is made to identify those methods that will be most useful, and overall conclusions regarding this concern are included. (ERA citation 05:020374)

EUR-6669 PC **A09**/MF **A01**
Commission of the European Communities, Brussels (Belgium).
Energy. Application of Solar Energy in Dwellings: A Technical and Economical Analysis for the European Community.
1980, 183p
U.S. Sales Only.

The technical possibilities and economical limitations of solar heating systems for the application in swimming-pools, hot water preparation, space heating and air conditioning were investigated. This analysis was performed for dwellings with

special consideration of the climatic differences in each E.C. country. The computer program, which was used for solar system calculations, and all mathematical models for technical and economical analysis are explained. In the technical and economical analysis the most suitable solar system sizes for each E.C. country was determined. Four types of solar collectors were investigated. The single glass selective collector proved to be the most cost effective collector in all the above applications, provided for that the additional cost for the selective coating is not more than 20 DM/m exp 2 . From the results of the analysis certain recommendations were derived, which can improve the rapid implementation of solar heating systems into the market. (ERA citation 05:020360)

HUD-PDR-287(2) MF **A01**
AIA Research Corp., Washington, DC.
Survey of Passive Solar Buildings.
Feb 79, 178p
Contract EX-76-A-29-1020
Microfiche copies only.

Classification and general descriptions of a variety of existing applications of passive solar design are presented. The passive systems are defined as direct gain, indirect gain, or isolated gain. Direct gain systems simply transfer solar insolation to the living space and to thermal mass. Designs utilizing this concept are described. Indirect gain systems in which thermal energy is moved to a storage mass and then to the living space include mass Trombe walls, water Trombe walls, and roof ponds. Isolated gain systems are illustrated by the thermosyphon type building and the sunspace type building; isolated gain designs move heat to a collector space to a storage mass to the living space. Diagrams and descriptions of the buildings cited are included along with a reference bibliography. (ERA citation 05:018706)

HUD-PDR-407 PC **A06/MF A01**
Franklin Research Center, Philadelphia, PA.
Installation Guidelines for Solar DHW Systems in One- and Two-Family Dwellings.
Apr 79, 114p
Contract EX-76-A-29-1020

Guidelines for professional installation contractors and experienced homeowners for installing solar domestic hot water systems are provided. The guidelines assume the installer has knowledge of plumbing, wiring, roofing, carpentry, masonry, paints, glazing, and insulation materials. Instructions are provided for: start-up, system layout, and siting; roof and ground mounting procedures; transfer fluids, piping, and ductwork; insulation; pumps, valves, gauges, and expansion tanks; heat exchangers and storage tanks; safety considerations; checkout and charge-up of the system; maintenance; and an installation checklist. Consideration is also given to tools, installation programs, and minimum property standards. (ERA citation 05:018738)

LA-UR-78-1316 MF **A01**
Los Alamos Scientific Lab., NM.
Designing Passive Solar Buildings to Reduce Temperature Swings.
D. Balcomb. May 78, 8p
Contract W-7405-ENG-36
Microfiche copies only.

Control of temperature swings is a major consideration in design of passive solar heated buildings - especially so as the designer seeks to achieve most of the building heat from the sun. Observations of temperature swings in several passive buildings are cited. Methods of temperature control are discussed, both by means of control intervention such as using of auxiliary backup heating, ventilation, and blowers, and by means of building design. The design approach is preferred as the main course with the intervention techniques used for fine tuning. (ERA citation 05:022187)

LA-UR-80-702 MF **A01**
Los Alamos Scientific Lab., NM.
Rules of Thumb for Passive Solar Heating.
J. D. Balcomb. 1980, 6p CONF-800604-8
Contract W-7405-ENG-36
American section of the International Solar Energy Society conference, Phoenix, AZ, USA, 2 Jun 1980.
Microfiche copies only.

Rules of thumb are given for passive solar systems for: (1) sizing solar glazing for 219 cities, (2) sizing thermal storage mass, and (3) building orientation. (ERA citation 05:020378)

LA-UR-80-746 PC **A02/MF A01**
Los Alamos Scientific Lab., NM.
Energy Savings Obtainable Through Passive Solar Techniques.
J. D. Balcomb. 1980, 13p CONF-800524-1
Contract W-7405-ENG-36
International congress on building energy management, Povoa de Varzim, Portugal, 12 May 1980.

A passive solar energy system is one in which the thermal energy flow is by natural means, that is by radiation, conduction, or natural convection. The purpose of the paper is to provide a survey of passive solar heating experience, especially in the US. Design approaches are reviewed and examples shown. Misconceptions are discussed. Advantages are listed. The Los Alamos program of performance simulation and evaluation is described and a simplified method of performance estimation is outlined. (ERA citation 05:020379)

LA-UR-80-853 PC **A02/MF A01**
Los Alamos Scientific Lab., NM.
Performance Estimates for Attached-Sunspace Passive Solar Heated Buildings.
R. D. McFarland, and R. W. Jones. 1980, 6p CONF-800604-4
Contract W-7405-ENG-36
American section of the International Solar Energy Society conference, Phoenix, AZ, USA, 2 Jun 1980.

Performance predictions have been made for attached-sunspace types of passively solar heated buildings. The predictions are based on hour-by-hour computer simulations using computer models developed in the framework of PASOLE, the Los Alamos Scientific Laboratory (LASL) passive solar energy simulation program. The models have been validated by detailed comparison with actual hourly temperature measurements taken in attached-sunspace test rooms at LASL. (ERA citation 05:022188)

LBL-9578 PC **A04/MF A01**
John B. Pierce Foundation Lab., New Haven, CT.
Ventilation and Odor Control: Prospects for Energy Efficiency. Final Report of Phase I.
W. S. Cain, L. G. Berglund, R. A. Duffee, and A. Turk. Nov 79, 67p
Contract W-7405-ENG-48

The various factors that play a role in the determination of ventilation requirements for odor control are described. Studies that uncovered and quantified the connection between odors and ventilation systems requirements are reviewed. They were usually motivated by interest in public hygiene and health. Recent discoveries regarding excessive levels of formaldehyde in buildings lined with chipboard, excessive levels of particulate matter in the vicinity of smokers, and excessive levels of oxides of nitrogen in homes with gas stoves, have, in conjunction with the need for energy efficiency, refocused attention on the origin and adequacy of non-industrial ventilation rates. Subsequent to a review of the research basis for modern ventilation rates, the varieties of odor control applicable indoors are examined. The section on control deals at length with chemical and engineering considerations in the use of granular filter media, the most practical means of indoor odor control. A chapter on odor perception focuses on sensory phenomena, followed by a chapter on both chemical and psychophysical methodology. Prospects are discussed in the final chapter. (ERA citation 05:018981)

MSNW-78-3035(V.1) PC **A04/MF A01**
Mathematical Sciences Northwest, Inc., Bellevue, WA.
Analysis and Simulation of Performance Data for Residential Solar Heating and Heat Pump System in Seattle, Washington. Final Report.
R. Taussig, J. Lockett, M. Storie, J. Isakson, and B. Levy. 15 Jun 78, 68p
Contract EG-77-C-02-4229

The Pacific Cascades is a distinct climatological region for solar energy applications. In order to investigate the effect of the regional differences in solar energy availability on residential solar heating systems, a study was conducted to analyze the performance of a solar heated house in this region and to validate a solar heating and heat pump computer simulation program for this region. The house, called the Seattle City Light Project Weathervane house, uses solar energy from roof-top flat plate collectors to boost the performance of a water-to-air heat pump. If the temperature of the water storage tank drops too low, then auxiliary heating is provided by an off-peak immersion heater. Performance data for the ten-month heating season was collected from Seattle City Light, and put into the form of a comprehensive baseline data document during this study. The University of Wisconsin TRNSYS solar heating computer simulation program was used to model the performance of the house. The computer results were compared to the actual performance data in order to help validate TRNSYS with regional solar heating data. The computer results were also used to help in understanding the behavior of the Seattle City Light Project Weathervane house heating system. Actual solar heating system performance demonstrates that approximately 40 percent of the total house heating requirements were provided by the solar heating system. The impact on utility peak load requirements was reduced by the off-peak auxiliary heating requirements. Significant heating was supplied by hot water taken directly from the storage tank when the water storage tank temperature was high. The computer program modeled the heating system behavior qualitatively hour-by-hour, and over periods of a week or greater, the simulation also agreed quantitatively with the energy used by the actual heating system. Details of the analysis and results are presented. (ERA citation 05:022189)

NESEC-7 PC **A10/MF A01**
Northeast Solar Energy Center, Boston, MA.
Solar Assessment of Non-Federal Public Buildings in the Northeast Region.
Apr 80, 218p
Contract AC02-80CS30149

The activities and results of the Non-Federal Public Buildings Assessment are presented. The thrust of the project was solely on domestic hot water and space heating applications, with energy provided by active or passive solar thermal, wood, and possibly, wind. Individual state summaries are included which were abstracted from the final reports submitted by the states. Three appendices are included as examples of the delivered results of this project. The examples shown demonstrate three different approaches to this assessment and are typical of the accomplishments in the other states. The New Hampshire example is that of a consultant architectural and engineering firm performing the assessment. The New York example is for a self-assessment performed by the building manager. The Pennsylvania example is of data collection by the individual building manager with judgment made by the State Energy Office upon return of data. (ERA citation 05:020381)

NP-24377 PC **A04/MF A01**
Tata Inst. of Fundamental Research, Bombay (India).
Solar Passive Systems for Buildings.
Mar 80, 52p
U.S. Sales Only.

A survey is presented of design knowledge and systematic presentation of proven concepts is provided with suitable illustrations. Current design literature was studied to provide an overview of building practices. (ERA citation 05:022192)

N80-25380/0 PC **A03/MF A01**
Vought Corp., Dallas, TX.
Design and Development of a Hard Tube Flexible Radiator System.
Final Report.
C. W. Hixon. 25 Apr 80, 40p NASA-CR-160663, REPT-2-30320/OR-52416
Contract NAS9-14776

The construction and operational characteristics of an extended life flexible radiator panel is described. The radiator panel consists of a flexible fin laminate and stainless steel flow tubes designed for a 90 percent probability of surviving 5 years in

an Earth orbit micrometeoroid environment. The radiator panel rejects 1.1 kW sub t of heat into an environmental sink temperature of 0 F. Total area is 170 square feet and the panel extends 25 feet in the fully deployed position. When retracted the panel rolls onto a 11.5 inch diameter by 52 inch long storage drum, for a final stored diameter of 22 inches.

N80-25784/3 PC **A03**/MF **A01**
Radian Corp., Austin, TX.
Solar Heating and Cooling Demonstration Project at Radian Corporation, Austin, Texas.
Final Report.
May 80, 41p NASA-CR-161442
Contract EX-76-C-01-2396
Sponsored in Part by NASA.

The solar heating and cooling system located at the Radian Corporation, Austin, Texas, is discussed. A technical description of the solar system is presented. The costs of the major components and the cost of installing the system are described. Flow diagrams and photographs of the solar system are provided.

N80-25786/8 PC **A09**/MF **A01**
Telex Communications, Inc., Blue Earth, MN.
Solar Heating System Installed at Telex Communications, Inc., Blue Earth, Minnesota.
Final Report.
26 Oct 77, 177p NASA-CR-161437
Contract E(49-18)-2376

The solar heating system for space heating a 97,000 square foot building which houses administrative offices, assembly areas, and warehouse space is summarized. Information on system description, test data, major problems and resolutions, performance, operation and maintenance manual, manufacturer's literature, and as-built drawings is presented.

N80-25787/6 PC **A06**/MF **A01**
IBM Federal Systems Div., Huntsville, AL.
Solar Energy System Performance Evaluation: Seasonal Report for Decade 80 House, Tucson, Arizona.
Progress Report, Nov. 1973 - Sep. 1979.
May 80, 103p NASA-CR-161450
Contract NAS8-32036
Prepared for DOE.

The operational and thermal performance of the Decade 80 solar energy system is described. The system was designed by Cooper Development Association, Inc. with space heating and space cooling to a one-story, single family residence located in Tucson, Arizona. The Decade 80 House was designed and built in the mid-70's to be a showplace/workshop for solar energy utilization. Superior construction techniques, the use of quality materials and a full time maintenance staff have served to make the entire system an outstanding example of the application of solar energy for residential purposes. The luxury of a full time, on-site maintenance person is perhaps the single most important aspect of this program. While most installations cannot support this level of maintenance, it was very useful in keeping all subsystems operating in top form and allowing for a full season data collection to be obtained. Several conclusions were drawn from the long term monitoring effort, among which are: (1) flat plate collectors will support cooling; (2) definite energy savings can be realized; and (3) more frequenct periodic maintenance may be required on solar energy systems that are not custom built.

N80-25788/4 PC **A04**/MF **A01**
Gilliland-Bell Associates, Inc., Greenwood, SC.
Solar Heating and Hot Water System Installed at Municipal Building Complex, Abbeville, South Carolina.
Final Report.
Nov 79, 54p NASA-CR-161443
Contract EM-78-F-01-5202
Sponsored in Part by NASA.

Information on the solar energy system installed at the new municipal building for the City of Abbeville, SC is presented, including a description of solar energy system and buildings, lessons learned, and recommendations. The solar space heating system is a direct air heating system. The flat roof collector panel was sized to provide 75% of the heating requirement based on an average day in January. The collectors used are job-built with two layers of filon corrugated fiberglass FRP panels cross lapped make up the cover. The storage consists of a pit filled with washed 3/4 in - 1 1/2 in diameter crushed granite stone. The air handler includes the air handling mechanism, motorized dampers, air circulating blower, sensors, control relays and mode control unit. Solar heating of water is provided only those times when the hot air in the collector is exhausted to the outside.

N80-25790/0 PC **A05**/MF **A01**
IBM Federal Systems Div., Huntsville, AL.
Solar Energy System Performance Evaluation: Seasonal Report for IBM System 1A, Huntsville, Alabama.
Contractor Report, Sep. 1978 - Aug. 1979.
May 80, 85p NASA-CR-161464
Contract NAS8-32036
Sponsored in Part by DOE.

The operational and thermal performance of the solar energy system, Sims Prototype System 1A, is described. The system was designed by IBM to provide 50 to 60 percent of the space heating and domestic hot water preheating load to a 2,000 square foot floor space single family residence in the Huntsville area. The load design temperature inside the building was to be maintained at 70 degrees fahrenheit with auxiliary energy for heating supplied by an electric heat pump assisted by an electric resistance strip heater. In general the disappointing operation of this system is attributed to the manner in which it was used. The system was designed for residential application and used to satisfy the demands of an office environment. The differences were: (1) inside temperature was not maintained at 70 F as expected; and (2) hot water usage was much lower than expected. The conclusion is that the solar energy system must be designed for the type of application in which it is used. Misapplication usually will have an adverse affect on system performance.

N80-25791/8 PC **A05**/MF **A01**
IBM Federal Systems Div., Huntsville, ALA.
Solar Energy System Performance Evaluaton: Seasonal Report for Solaron-Akron, Akron, Ohio.
Contractor Report, Nov. 1978 - Oct. 1979.
May 80, 87p NASA-CR-161465
Contract NAS8-32036
Sponsored in Part by DOE.

The operational and thermal performance of the solar energy system by Solaron Corporation is described. The system was designed to provide an 1940 square foot floor area with space heating and domestic hot water for a dual-level single family residence in Akron, Ohio. The solar energy system uses air as the heat transport medium, has a 546 square foot flat plate collector array subsystem, a 270 cubic foot rock thermal storage bin subsystem, a domestic hot water preheat tank, pumps, controls and transport lines. In general, the performance of the Solaron Akron solar energy system was somewhat difficult to assess for the November 1978 through October 1979 time period. The problems relating to the control systems, various solar energy leakages, air flow correction factors and instrumentation cause a significant amount of subjectivity to be involved in the performance assessment for this solar energy system. Had these problems not been present, it is felt that this system would have exhibited a resonably high level of measured performance.

ORNL/Sub-79/13660/1 PC **A03**/MF **A01**
Weidt (John) Associates, Inc., Minneapolis, MN.
Minnesota Retrofit Insulation IN-Situ Test Program: Extension and Review.
Feb 80, 40p
Contract W-7405-ENG-26

An insulation's performance is of primary concern to the consumer who is considering re-insulating his home. Minnesota Retrofit Insulation In Situ Test Program, published by the Department of Energy in June 1978, details the findings of an in situ study of various thermal insulations installed in 55 residences in the Minneapolis/St. Paul area. The study, conducted in the summer of 1977, consisted of field observations and laboratory measurements of properties critical to the insulations' performance. Properties studied included density, thermal resistance, moisture content, shrinkage, flammability, friability, and compression strength. This study, Phase I, was extended with a second phase to include further in-situ study of retrofit insulations. Included in this extension work, Phase II, was a further study of the moisture content of insulations, the corrosiveness of retrofit loose-fill cellulose insulation, thermography and field observations of sidewalls for signs of settling of retrofit loose-fill insulations, analysis of fuel consumption data for a number of the retrofitted homes, and density and thermal resistance retests of loose-fill insulations. This report details the field and laboratory findings of Phase II. (ERA citation 05:018995)

PAT-APPL-6-021 292 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Passive Environmental Temperature Control System.
Patent Application,
J. M. Corliss, II, and G. H. Stickford. Filed 16 Mar 79, 15p
Contract EG-77-C-03-1601
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Passive environmental heating and cooling systems are described, which utilize heat pipes to transmit heat to or from a thermal reservoir. In a solar heating system, a heat pipe is utilized to carry heat from a solar heat absorber plate that receives sunlight, through a thermal insulation barrier, to a heat storage wall, with the outer end of the pipe which is in contact with the solar absorber being lower than the inner end. The inclining of the heat pipe assures that the portion of working fluid, such as Freon, which is in a liquid phase will fall by gravity to the outer end of the pipe, thereby assuring diode action that prevents the reverse transfer of heat from the reservoir to the outside on cool nights. In a cooling system, the outer end of the pipe which connects to a heat dissipator, is higher than the inner end that is coupled to a cold reservoir, to allow heat transfer only out of the reservoir to the heat dissipator, and not in the reverse direction. (EPA citation 05:023874)

PATENT-4 199 937
Not available NTIS
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Heat Exchanger and Method of Making.
Patent,
A. Fortini, and J. M. Kazaroff. Filed 30 Nov 77, patented 29 Apr 80, 6p N80-24573/1, PAT-APPL-856 462
Supersedes PAT-APPL-856 462-77, N79-21313 (17 - 02, p 0164).
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

A heat exchange of increased effectiveness is disclosed. A porous metal matrix is disposed in a metal chamber or between walls through which a heat-transfer fluid is directed. The porous metal matrix has internal bonds and is bonded to the chamber in order to remove all thermal contact resistance within the composite structure. Utilization of the invention in a rocket chamber is disclosed as a specific use. Also disclosed is a method of constructing the heat exchanger.

PB80-193576 PC **A08**/MF **A01**
Stanford Univ., CA. Inst. for Communication Research.
Solar Diffusion in California: A Pilot Study.
Consultant rept. (Final),
Everett M. Rogers, Dorothy Leonard-Barton, Tamar Avi-Itzhak, Eugene Rosa, and Ronny Adhikarya. Oct 79, 161p CAEC-65, CAEC,-500-79-014

The purpose of the study was to determine the level of homeowner awareness about residential solar energy systems, describe characteristics of consumers purchasing solar equipment (e.g. whether they represent identifiable market segments), identify major channels of communication through which solar information is effectively used,

determine remaining barriers to solar use, identify needed incentives to accelerate commercialization, and assess public attitudes toward various state and federal government actions to increase the rate of solar energy use statewide.

RLO-2227-T22-15 PC **A03/MF A01**
Oregon State Univ., Corvallis.
Design Guideline Handbook for Industrial Spreader Stoker Boilers Fired with Wood and Bark Residue Fuels.
D. C. Junge. Feb 79, 26p
Contract EY-76-S-06-2227-022

An experimental research program was conducted at Oregon State University to develop a data base on the combustion characteristics of wood residue fuels as they are burned in industrial spreader stoker boilers. The results of the experimental program impact on the design of industrial spreader stoker boilers can be used to optimize the design of these boilers. This design guideline handbook is an abbreviated summary of design criteria for industrial spreader stoker boilers fired with wood and bark residue fuels. Suggested methods to improve the design and performance of these systems are included. (ERA citation 05:022011)

SERI/RR-351-413 PC **A04/MF A01**
Solar Energy Research Inst., Golden, CO.
Comparison of Six Generic Solar Domestic Hot Water Systems.
R. B. Farrington, L. M. Murphy, and D. L. Noreen. Apr 80, 74p
Contract EG-77-C-01-4042

The cost effectiveness of residential solar water heating is explored by analyzing six different system types. A figure of merit (that considers both performance and cost) is calculated for each system, providing information for both researchers and industry. Thermosyphon water heaters are determined to be the most cost effective option, and their wider application is recommended once a reliable draindown technique is developed. (ERA citation 05:022214)

13B. Civil Engineering

AD-A085 380/4 MF **A01**
Army Engineer Waterways Experiment Station Vicksburg MS Structures Lab
Concrete and Rock Tests, Major Rehabilitation and Compliance, Lockport Lock, Illinois Waterway, Chicago District.
Final rept.,
R. L. Stowe, Steven A. Ragan, Roy L. Campbell, Barbara A. Pavlov, and Henry T. Thornton, Jr.
Apr 80, 166p Rept no. WES/MP/SL-80-4
See also AD-A061 711 and AD-A085 584.
Availability: Microfiche copies only.

A crack survey, drilling, field and laboratory testing of concrete, and laboratory testing of foundation rock were carried out as part of a major rehabilitation and compliance program at Lockport Lock. The work was performed for purposes of determining if significant structural cracks exist at the lock and the extent and cause of concrete deterioration. Selected physical properties of the concrete and foundation rock were determined to verify previous properties. A significant crack exists in the land lock wall. The crack increased in width during an instrumentation monitoring study performed subsequent to the major rehabilitation and compliance studies. Movement of one vertical monolith joint was monitored on the riverside lower approach wall.

AD-A085 382/0 MF **A01**
GAI Consultants Inc Monroeville PA
National Dam Inspection Program. Rockview Reservoir Dam. (NDI I.D. Number PA-00472 Pender I.D. Number 14-90) Susquehanna River Basin. McBrides Run, Centre County, Pennsylvania. Phase I Inspection Report.
Mar 80, 91p
Contract DACW31-80-C-0016
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.
Availability: Microfiche copies only.

The visual inspection, operational history, and hydrologic/hydraulic analysis indicate that the facility is in good condition. The size classification of the facility is intermediate and its hazard classification is considered to be high. In accordance with the recommended guidelines, the Spillway Design Flood (SDF) for the facility is considered to be the PMF (Probable Maximum Flood). Results of the hydrologic and hydraulic analysis indicate the facility will pass and/or store about 52 percent of the PMF prior to dam overtopping. Thus, based on criteria contained in the recommended guidelines, the spillway is considered inadequate, but not seriously inadequate. Deficiencies noted by the inspection team include: (a) an inoperable blowoff conduit, (b) concrete deterioration over much of the exposed surfaces of the dam, (c) lack of formal operations and maintenance manuals, and (d) no formal warning system in effect.

AD-A085 447/1 PC **A04/MF A01**
Civil Engineering Lab (Navy) Port Hueneme CA
Sloping Float Breakwater: Interim Data Summary.
Rept. for Aug 78-Mar 79,
D. B. Jones. Jan 80, 55p Rept no. CEL-TN-1568

The sloping float breakwater consists of a row of bargelike pontoons moored so that, at rest, the shoreward ends, which are ballasted, rest on the seafloor while the seaward ends, which are buoyant, project slightly above the water surface. Ammi barges and NL pontoon structures have been proposed as breakwater modules. The findings of all previously reported experiments and studies of this concept are brought together to provide an interim summary of data on wave attenuation, mooring forces, ocean transport, and installation. The sloping float concept has potential as a ship-transportable breakwater for relatively shallow water (coastal waters). Floats 90 feet long located in 30 feet of water reduce by about 50 per cent the significant wave height of local-wind-generated waves (Pierson-Moskowitz spectrum) with a dominant (spectral peak) period of 7 seconds. (Author)

AD-A085 460/4 PC **A13/MF A01**
Coast Guard Washington DC
Regulatory Analysis and Environmental Impact Statement. Regulations to Implement the Results of the International Conference on Tanker Safety and Pollution Prevention.
Final rept.
14 Nov 79, 277p

This document addresses the environmental and economic considerations of rulemaking actions concerning new standards for segregated ballast tanks, dedicated clean ballast tanks, crude oil washing systems, inert gas systems, and improved steering systems aboard U. S. flag tankers and foreign flag tankers which call on U. S. ports. (Author)

AD-A085 469/5 PC **A03/MF A01**
Naval Weapons Center China Lake CA
Studies on the Removal of Carbon Monoxide From the Atmosphere at Ambient Temperature.
Final rept.,
Dwight A. Fine, and Carl A. Heller. May 80, 26p
Rept no. NWC-TP-6179

Catalysts of platinum or palladium on carbon or alumina show much promise in removing carbon monoxide (CO) from air at room temperature. As much as 80% of the CO in a 230 ppm CO/air mixture was removed by 1 g of 5% palladium on carbon powder in one pass. Catalysts of 0.5% metal on alumina pellets showed comparable efficiency, and proved much more convenient to handle. Calculations indicate that the CO concentration in 1000 cu ft of air containing 500 ppm CO could be reduced to 200 ppm in 100 minutes using only 180 g (0.4 pound) of 0.5% palladium catalyst and a pump moving 10 cu ft per minute of air (one pass of air through catalyst). Solutions of copper(I) in monoethanolamine proved much less efficient due to oxidation problems. (Author)

AD-A085 584/1 MF **A01**
Army Engineer Waterways Experiment Station Vicksburg MS Structures Lab
Concrete and Rock Tests, Major Rehabilitation of Starved Rock Lock and Dam, Illinois Waterway, Chicago District. Phase II. Compliance, Scour Detection.
Final rept.,
R. L. Stowe, and B. A. Pavlov. Apr 80, 198p Rept no. WES/MP/SL-80-6
See also Phase 1, AD-A061 711.
Availability: Microfiche copies only.

Drilling for laboratory testing of concrete and foundation rock was carried out for the U.S. Army Engineer District, Chicago, as part of a major rehabilitation program at the Starved Rock Lock and Dam. The structures are on the Illinois Waterway. This report covers the work accomplished during the Phase II program entitled 'Compliance and Scour Detection'. The compliance portion of the work was conducted for purposes of determining selected characterization and engineering design parameters on any foundation materials that were different than previously detected. A secondary purpose of the compliance work was to ascertain the base elevation of the head and taintor gate dams. The scour detection portion of the work was accomplished to determine undercutting of the dam (behind the dam) and the depth of possible scouring behind the taintor gate dam. A loosely cemented sand was discovered under a portion of the head gates dam. Direct shear tests were performed on the material and a cohesion of 0.22 tsf and an angle of internal friction of 27 deg were obtained from the test results. The base of the head and taintor gate dam was found with borings to be significantly different than that shown on original working drawings. of 26 borings through the head and taintor gate dam, 20 showed the base elevation of the dam to be deeper than that shown on the working drawings. Six borings through the head gate dam showed the base of the dam to be resting on the loosely cemented sand and as much as 5.3 ft above the base elevation shown on the original working drawings.

AD-A085 738/3 MF **A01**
Woodward-Clyde Consultants Plymouth Meeting PA
National Dam Inspection Program. Broomalls Dam (NDS I.D. Number PA 00349. DER I.D. Number 23-9), Delaware River Basin, Tributary to Ridley Creek, Delaware County, Pennsylvania. Phase I Inspection Report.
Mary F. Beck, and John Henry Frederick, Jr. Mar 80, 91p
Contract DACW31-80-C-0018
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.
Availability: Microfiche copies only.

Visual inspection indicates that the dam and spillway structures of Broomalls Dam are in poor conditon. In 1970, the original spillway capacity was supplemented by the installation of three 27 inch by 43 inch corrugated metal pipe arches, with an entrance invert about five inches above the spillway and discharging at the downstream toe. The November inspection disclosed that surface erosion above the pipes had occurred, probably as a result of surface runoff over the downstream parapet wall. Some erosion below the culvert outlets was evident. Subsequent inspection in February 1980, disclosed considerable erosion and apparent piping at the downstream end of the culverts. One culvert was filled with ice at its outlet and had a column of ice reaching from the outlet to the ground surface. Ice was also visible at the junction of the culverts and embankment. There appears to be a small, constant, undetermined source of water for ice formation. At the requests of local Department of Environmental Resources officials, the Reservoir has been lowered about 2.5 feet through the upper drain. As a result of the rapid deterioration in the condition of the dam since November, the dam is considered to be in an 'Unsafe, nonemergency' condition.

AD-A085 765/6 MF **A01**
Holston Defense Corp Kingsport TN
Analysis of Wastewater for Organic Compounds Unique to RDX/HMX Manufacturing and Processing.
Final engineering rept. 1974-1979,
Billy R. Stidham. Dec 79, 169p Rept no. HDC-51-79
Contract DAAA09-78-C-3000
Availability: Microfiche copies only.

Sensitive analytical methods were developed for the direct determination of RDX, HMX, TAX, SEX and TNT in wastewater. Reverse Phase HPLC and

direct injection of the aqueous sample extended the statistical lower detection limit for each component to less than 65 micrograms/1. RDX, HMX, TAX and SEX were the only nitramines detected in wastewater at the Holston Army Ammunition Plant, and only RDX and HMX were detected in Holston River water one mile below the last plant effluent. Four cyclohexanone-derived compounds were identified as probably constituents of plant wastes; one, or possibly two, of these were found in the Holston River. (Author)

AD-A085 798/7 PC **A04**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg MS Structures Lab
Birds Point-New Madrid Floodway, Emergency Operation; Explosive Design Summary.
Final rept. Apr-Dec 79,
Allen D. Rooke, Jr. Apr 80, 53p Rept no. WES/MP/SL-80-5

At the request of the Mississippi River Commission, a design was prepared by the U. S. Army Engineer Waterways Experiment Station (WES) for the explosive excavation of a length of levee, part of an emergency operation plan for the Birds Point-New Madrid Floodway in the U. S. Army Engineer District, Memphis. Field tests leading to the explosive design were conducted at the WES Big Black Test Site, and consisted of four phases: (a) detonating cord layout, (b) full-scale borehole loading of candidate explosives, (c) a one-third-scale model, and (d) longitudinal spacing. From tests of commercial slurry explosives recommended by manufacturers, an explosive was selected for the excavation, and a layout and borehole depth were determined, based upon expected crater size, for an array of three rows of vertically emplaced, water-stemmed charges. Alternate slurries and accompanying spacings are included. (Author)

BNL-51068 PC **A04**/MF **A01**
Brookhaven National Lab., Upton, NY.
New Techniques for Analyzing Relationships Between Energy and Water Quality.
E. Kaplan, and H. C. Thode, Jr. 1980, 70p
Contract EY-76-C-02-0016

Water quality data for 65 variables were obtained for the period 1955 to 1977 and aggregated on a county basis. Measurements were taken primarily in New England and the Middle Atlantic States. When a subset of 138 counties with complete data was used, it was found that county aggregation statistical procedures resulted in data still able to describe the chemical characteristics of natural waters. Energy and socioeconomic data were merged with water quality data for these 138 counties. The path analytic methodology used by geneticists was adapted for use with these combined data to investigate for potential interactions between energy-related activities and water quality. A path diagram was proposed to provide insight into the possible causal nature of these interrelations. Direct and indirect pathways from energy production and use were traced to three factors describing functional attributes of water: conductivity, hardness, and dissolved metallic ions. This analysis explained 25 to 40% of the variance in three water quality factors and indicated the applicability of this technique to regional assessments of water quality impacts due to many human activities. (ERA citation 05:021202)

CONF-790468-2 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Flexible Role for Simulation Modeling in Environmental Decisions: Models of the Global Carbon Cycle as an Example.
W. R. Emanuel. 1979, 21p
Contract W-7405-ENG-26
Institute of ecology workshop on information needs in environmental assessment, Indianapolis, IN, USA, 8 Apr 1979.

The progression of models developed to analyze the global carbon cycle in resolving the CO sub 2 / climate issue serves as an example of the changing character of models, depending on the immediate role they play in environmental decision making. The dominant and successful role served by models in the carbon cycle problem demonstrates to some degree the desirability of this flexible approach. The pattern of model development will be different for each application of modeling to environmental decision making; however, some general similarities frequently emerge. Simple models, heavily based in measurements, are often the most useful in assisting decision makers to establish priorities among a set of environmental issues. When the decision to allocate resources to the analysis of an environmental problem has been reached, structurally detailed models which are not necessarily sophisticated in the representation of each process are useful in establishing the relative importance of system interactions. Models in which structure is condensed but sophistication in representing processes is emphasized are used in actually developing policy. Finally, the design of management practices to mitigate an environmental impact requires the most complex models which usually can only be developed when the insight from earlier stages of analysis has been gained. (ERA citation 05:021132)

CONF-800124-1 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Development of a Wastewater Treatment System Based on a Fixed-Film, Anaerobic Bioreactor.
R. K. Genung, W. W. Pitt, Jr., G. M. Davis, and J. H. Koon. 1980, 37p
Contract W-7405-ENG-26
DOE workshop on anaerobic filters, Howey-in-the-Hills, FL, USA, 8 Jan 1980.

An energy-conserving wastewater treatment system based on a fixed-film anaerobic bioreactor is being developed. The treatment process is based on passing wastewaters upward through the bioreactor for continuous treatment by gravitational settling, biophysical filtration, and biological decomposition. A 2-year pilot plant project using a bioreactor designed to treat 5000 gpd has been conducted using raw wastewater on a municipal site in Oak Ridge, Tennessee. It is estimated that hydraulic loading rates of 0.2 gpm/ft exp 2 and hydraulic residence times of 10 h could be used in designing such bioreactors for the secondary treatment of municipal wastewaters. Conceptual designs for total treatment systems processing up to 1.0 million gallons of wastewater per day (mgd of wastewater) were developed based on the performance of the pilot-plant bioreactor. These systems were compared to activated sludge treatment systems also operating under secondary treatment requirements and were found to consume as little as 30% of the energy required by the activated sludge systems. The economic advantages of the process result from the elimination of operating energy requirements associated with the aeration of aerobic-based processes and with the significant decrease of sludge-handling costs required with conventional activated-sludge treatment systems. Methane produced by anaerobic fermentation processes occurring during the biological decomposition of carbonaceous wastes also represented a significant and recoverable energy production term as wastewater flow rates approached 1.0 mgd. (ERA citation 05:022610)

CONF-800416-7 MF **A01**
Oak Ridge National Lab., TN.
Computer Model for Selecting Flow Measuring Structures in Open Channels.
M. J. Hickey. 1980, 5p
Contract W-7405-ENG-26
UCC-ND and GAT waste management seminar program, Portsmouth, OH, USA, 22 Apr 1980.
Microfiche copies only.

Quantifying various pollutants in natural waterways has received increased emphasis with more stringent regulations issued by the Environmental Protection Agency (E.P.A.). Measuring natural stream fows presents a magnitude of problems, the most significant is the type of structure needed to measure the flows at the desired level of accuracy. A computer model designed to select a structure to best fit the engineer's needs is under development. This model, given the pertinent boundary conditions, will pinpoint the structure most suitable, if one exists. This selection process greatly facilitates the old selection process of trial and error. (ERA citation 05:022981)

DOE/ET/14879-T2 PC **A02**/MF **A01**
State Univ. of New York at Binghamton. Dept. of Chemistry.
Desulfurization with Transition Metal Catalysts. Quarterly Summary.
J. J. Eisch. 10 Apr 80, 5p
Contract AC01-79ET14879

The overall objective of this research is to develop desulfurizing transition metal catalysts, which are active in homogeneous media at moderate temperatures and pressures for the purification of coal-derived fuels and chemicals. To this end, the mechanism of action is being examined whereby newly identified nickel(0) complexes desulfurize organosulfur compounds in solution at 65 to 70 exp 0 C. The sulfur compounds under investigation are typical of those commonly encountered in coal-derived liquids and solids, such as thiophenes, sulfides and mercaptans. The following studies on the homogeneous, stoichiometric desulfurizing agent, bis(1,5-cyclooctadiene) nickel(0) ((COD) sub 2 Ni), were continued: (a) activation of the agent by means of added mono-, bi- exp 2 and tri-dentate amines, either of the tertiary or primary amine type; (b) labeling studies designed to reveal the source of the hydrogen that replaces the sulfur in the desulfurization of dibenzothiophene; (c) comparison of the desulfurizing activity of (COD) sub 2 Ni, both in the presence and in the absence of lithium aluminum hydride; and (d) testing for the role of any biphenylene intermediate in these desulfurizations. Results are reported. (ERA citation 05:021574)

DOE/EV/10253-1 PC **A03**/MF **A01**
Notre Dame Univ., IN. Dept. of Civil Engineering.
Hydrodynamic and Chemical Modeling of Heavy Metals in Ash Pond Leachates. Progress Report, July 1, 1979-April 1, 1980.
T. L. Theis, D. J. Kirkner, and A. A. Jennings.
Mar 80, 34p
Contract AC02-79EV10253

A report is given on the development of a finite element/chemical equilibrium subsurface flow model for application to inorganic transport around waste disposal sites. Included is an outline of the cooperative effort among several investigators from other research facilities on various aspects of the problem. These tasks include soil column studies for use with the one-dimensional model, laboratory batch studies to define the necessary thermodynamic constants, soil chemistry characterization studies, organic studies, leachate composition evaluation, and assessment of available field data. With respect to modeling activities both the finite element and chemical equilibrium models are described. The basic mathematical problem is reviewed, and the proposed coupling algorithm is presented in greater detail than previously. (ERA citation 05:021677)

EGG-2028 PC **A04**/MF **A01**
Idaho National Engineering Lab., Idaho Falls.
INEL Geothermal Environmental Program. 1979 Annual Report.
T. L. Thurow, and J. F. Sullivan. Apr 80, 51p
Contract EY-76-C-07-1570

The Raft River Geothermal Environmental Program is designed to assess beneficial and detrimental impacts to the ecosystem resulting from the development of moderate temperature geothermal resources in the valley. The results of this research contribute to developing an understanding of Raft River Valley ecology and provide a basis for making management decisions to reduce potential long-term detrimental impacts on the environment. The environmental monitoring and research efforts conducted during the past six years of geothermal development and planned future research are summarized. (ERA citation 05:022263)

FE-2739-T1 PC **A02**/MF **A01**
State Univ. of New York at Binghamton. Dept. of Chemistry.
Desulfurization with Transition Metal Catalysts. Final Technical Report.
J. J. Eisch. 1979, 19p
Contract EF-77-G-01-2739

Existing desulfurization procedures generally require elevated temperatures, high pressures of hydrogen and the use of heterogeneous catalysts; therefore such methods are unsuitable for the mild, controlled, stepwise degradation of coal required for structural studies. At the same time,

such processes are not the most efficient or economical for the practical purification of coal-derived fuels and chemicals. By replacing certain heterogeneous transition-metal catalysts by homogeneous or polymer-bonded catalysts, many important reactions (such as hydrogenation, unsaturated-hydrocarbon oligomerization and hydroformylation) show significant gains in rate or selectivity. Therefore, it is appealing to consider whether the catalytic scission of carbon-sulfur bonds might be achievable at much lower temperatures and pressures by the use of soluble transition-metal catalysts. Such mild desulfurizing conditions might mean a saving of time, energy and equipment expense for industrial processes used in desulfurizing coal-derived fuels and chemicals. In addition, homogeneous agents capable of cleaving carbon-sulfur bonds at low temperatures could be valuable in selectivity degrading the macrostructure of various coals into fragments suitable for structural studies. Ongoing research in the author's laboratory has uncovered novel nickel (0) reagents that desulfurize dibenzothiophene, a common consistent of coal tar, in an homogeneous medium at temperatures below 100 exp 0 . The first objective of this research, therefore, has been to make a thorough study of the mechanism and scope of this desulfurization, in which study a variety of organic sulfur compounds are being examined and the experimental variables maximized for mild, complete reaction. The second objective has been to evaluate low- or zero-valent transition metal compounds of molybdenum, tungsten, cobalt and iron, and o test their desulfurizing efficacy on a series of model organosulfur derivatives. (ERA citation 05:021579)

INIS-mf-4721 PC **A07**/MF **A01**
Havforskningsinstitutt, Bergen (Norway).
Thermal Power Plants in the Oslofjord District - Recipient Evaluations. Collective Report.
B. Boehle, D. Danielssen, S. Tveite, I. Haugen, and G. Nilsen. Nov 75, 130p
In Norwegian.
U.S. Sales Only.

The results presented in a series of reports from the three institutes concerning the physical characteristics of the waters in the vicinity of five possible sites for thermal (including nuclear) power plants in the Oslofjord district, and the spreading and effects of thermal effluents on the biological state and resources of these waters, are summarised, and an evaluation of the relative suitability of these sites is made. The sites are ranked as follows:- 1. Naverfjorden or, 2. Langangsfjorden - Saga, with effluent release to the Naverfjord region in both cases; 3. Vardeaasen; 4. Hurum; 5; Brenntangen. The possible intake - outlet arrangements are ranked as follows:-1. Deep intake - surface outlet, 2. Deep intake - deep outlet, or surface intake - surface outlet, 3. Surface intake - deep outlet. (Atomindex citation 11:499781)

K/C-1384 MF **A01**
Oak Ridge Gaseous Diffusion Plant, TN.
ORGDP Hazardous Materials Management Program. Environmental Protection.
T. P. A. Perry. 22 Apr 80, 9p
Contract W-7405-ENG-26
Microfiche copies only.

A description of the development and subsequent implementation of the ORGDP Hazardous Materials Management Program is presented. In addition to a general discussion of the major aspects of the program, specific examples of problems and solutions are presented. (ERA citation 05:020199)

N80-25392/5 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Pollutant Emissions from Flat-Flame Burners at High Pressures.
H. G. Maahs, and I. M. Miller. Jun 80, 41p NASA-TP-1673, L-13550

Maximum flame temperatures and pollutant emission measurements for NOx, CO, and UHC (unburned hydrocarbons) are reported for premixed methane air flat flames at constant total mass flow rate over the pressure range from 1.9 to 30 atm and for equivalence ratios from 0.84 to 1.12. For any given pressure, maxima typically occur in both the temperature and NOx emissions curves slightly to the lean side of stoichiometric conditions. The UHC emissions show minima at roughly the same equivalence ratios. The CO emissions, however, increase continually with increasing equivalence ratio. Flame temperature and NOx emissions decrease with increasing pressure, while the opposite is true for the CO and UHC emissions. The NOx data correlate reasonably well as a function of flame temperature only. Four flameholders, differing only slightly, were used. In general, the temperature and emissions data from these four flameholders are similar, but some differences also exist. These differences appear to be related to minor variations in the condition of the flameholder surfaces.

N80-25914/6 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Meterological Effects on Air Pollution in Sao Paulo.
A. Setzer, I. F. A. Cavalcanti, and B. C. Marcelino. Jan 80, 39p INPE-1669-RPE/107
Text in Portugese.

The relation among the meteorological parameters and indexes of pollution was analyzed to determine the critical conditions for producing high indexes. The period of verification was analyzed to show the influence of the existing system at the station. Results indicate that the synoptic situation is of fundamental importance in providing the local effects, which favor the concentration or dispersal of pollutants. It is recommended that this analysis be used in forecasting air pollution.

ORO-4946-5 PC **A13**/MF **A01**
Tennessee Univ., Knoxville.
Environmental Aspects of Coal Production in the Applachian Region. Progress Report, June 1, 1979-May 31, 1980.
R. A. Minear, D. E. Overton, G. L. Vaughn, and B. A. Tschantz. 15 Apr 80, 281p
Contract EY-76-S-05-4946

The overall project focus is on damage agent flow resulting from strip mining. Attention has focused on (1) field work related to quantifying sediment yield from control plots that have been reclaimed back to contour including surface runoff water quality; (2) continued measurement of water quality in six primary watersheds, 5 mined and 1 control, to follow the long term behavior of changes in water quality that results from mining activity; (3) continued measurement of biological changes that result from mining activity, the time required for recovery and the nature of recovery, i.e., changes in post mining community structure; and (4) application of simulation models for stream hydrographs, sediment detention basins and hydrologic assessments. Although field study plots had a uniform heavy grass and conformed to current state and federal reclamation standards, suspended sediment concentrations leaving the site consistently exceeded federal and state allowable concentration during all storms. Water quality changes that occur very soon after mining commences in a watershed, that is elevated calcium, magnesium, iron, manganese and sulfate, do not return to premining levels even after 5 years. Mining disturbance produces long term water quality changes in dissolved constituents, even in alkaline systems, which may have an economic impact on downstream water users. The major impact of strip mining on water quality is the continued production of suspended sediment in drainage streams. Significant biological changes occur in watershed streams after surface mining is initiated and are strongly related to suspended sediment. Recovery is observed and seems related to type of mining practiced and condition of tributary stream. A mathematical model for simulating stormwater response and pollutant yield in strip mined watersheds was developed. (ERA citation 05:021680)

PAT-APPL-6-132 589 PC **A03**/MF **A01**
Department of Agriculture, Washington, DC.
Method of Decontaminating Waste Liquors.
Patent Application,
Merle S. Masri. Filed 21 Mar 80, 28p PB80-191778
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Contaminants are removed from waste liquor particularly in a closed recirculatory system by adding a soluble silicate to the contaminated waste liquor in an amount sufficient to flocculate the contaminants. Then, the liquid is treated to separate the flocculated contaminants therefrom. Other features for enhancing flocculation of the contaminants in a waste liquor in conjunction with the above method are described. The method of the invention has particular application to wool scouring liquor.

PB80-188865 PC **A03**/MF **A01**
Rutgers - The State Univ., New Brunswick, NJ. Center for Urban Policy Research.
Practitioner's Guide to Fiscal Impact Analysis,
Robert W. Burchell, and David Listokin. 1980, 50p HUD-0001473
Sponsored in part by Department of Housing and Urban Development, Washington, DC. Office of Policy Research and Development.

The guide is derived from a HUD-funded research contract to assemble and disseminate standardized techniques to evaluate the public costs and revenues of land development. It summarizes the fiscal impact procedures, adds hypothetical problems for instructional purposes, and provides synopses of key data resources. Both planners and administrators can use it. An introductory section discusses the guide's organization and defines fiscal impact analysis as a projection of the direct, current public costs and revenues associated with residential or nonresidential growth to the local jurisdictions. Detailed cost projection methods with information on assumptions are supplied, as are enumerations of advantages and disadvantages and data requirements for each method. Revenue projection techniques with summaries of revenues that are affected by growth are presented also. Finally, information related to fiscal impact analysis, including material on the use of the procedure in ongoing planning, its legal standing, and the models and multipliers which may be used, is provided. Hypothetical problems and solutions that may be administered by the practitioners as working examples of each method are included. Tabular data is provided.

PB80-191547 PC **A99**/MF **A01**
Texas Tech Univ., Lubbock.
Watershed Impacts of Recreational Development in the Guadalupe Mountains National Park, Texas.
Technical completion rept.,
E. B. Fish, M. J. Dvoracek, V. B. Ackerson, B. L. Allen, and G. L. Brothers. Feb 80, 647p WB0,-05410, OWRT-B-206-TEX(2)
Contract DI-14-34-0001-7189
Prepared in cooperation with Texas A and M Univ., College Station. Texas Water Resources Inst.

In the southwestern United States, there is widespread concern about the hydrologic effects of a rapidly increasing population and the consequent drastic changes in the types and intensity of land use. This research effort was directed towards obtaining a data base consisting of climatic, vegetative, soil, erosional and hydrologic information which would be useful in the management decision making process for Guadalupe Mountains National Park, Texas. Based on initial studies five watersheds ranging in size from 25.32 square miles to 0.15 square miles were selected for intensive studies to quantify relationships between soil, vegetation, climatic, topographic, and geologic factors in such a way that they may be used as a basis for predicting the effects of modification in land use on erosion, water yield and quality, flooding and ground water supplies.

PB80-192396 PC **A06**/MF **A01**
Voorhees (Allen M.) and Associates, Inc., McLean, VA.
A Study of the Feasibility of Distributed Multi-Level Traffic Control Systems.
Final rept. Apr 78-Jan 80,
S. Basu, J. R. Wroble, P. J. Tarnoff, and J. P. Petrykanyn. Apr 80, 113p FHWA/RD-80/022
Contract DOT-FH-11-9413

The goal of the study is to identify conditions under which distributed multi-level traffic control systems (DMLS) can be most effectively deployed using state-of-the-art hardware and software. The final

report examines the feasibility of DMLS through utility-cost analysis and provides information that will be useful in determining the choice of control configuration for a specific traffic control system installation. This information includes tutorial and reference material, as well as examples of cost computations and utility-cost analysis. The report covers the following subjects: the development of a definition of DMLS and a state-of-the-art review of distributed traffic control; a development of different DMLS control configurations using UTCS software; and, an utility-cost analysis of the application of these control configurations to different street networks for each of two control requirements. The results of this analysis identify certain conditions under which distributed traffic control is likely to be cost-effective: the control requirements include other functions in addition to traffic control; the signal system consists of small clusters of signals scattered over an urban area, without a highly concentrated CBD; and, the signal system has few existing facilities, e.g. computers, interconnect.

PB80-192412 PC **A10**/MF **A01**
Cambridge Systematics, Inc., MA.
An Analysis of User Cost and Service Trade-Offs in Transit and Paratransit Services.
Final rept. Nov 77-Dec 78,
J. Louviere, and G. Kocur. Aug 79, 208p DOT/TSC-UM927-R9742, UMTA-MA-06-0049-79-10
Contract DOT-TSC-1405

The Xenia Model Transit Service served as a test of several alternative transit services operated in a small city setting. This project was undertaken as an aid to the evaluation of transit and paratransit systems in Xenia, Ohio, and as a test of a new technique for assessing travel demand. The technique, direct utility assessment, was designed to test a new method for assessing user trade-offs in costs and service based on attitudinal methods. A tradeoff survey was administered as part of a home interview survey. Data from the tradeoff survey were used to develop separate equations for each sample respondent to explain and describe their tradeoffs over transit fare, travel time, walk distance, type of service, and headway. An aggregate equation was also developed, assuming that all respondents shared common tradeoffs. These equations were employed to retrospectively predict changes in transit system patronage (since 1974). Both sets of models performed well, producing forecasts that were in the same direction and range of experience, although magnitudes were somewhat different.

PB80-192602 PC **A09**/MF **A01**
Acurex Corp., Mountain View, CA. Energy and Environmental Div.
Assessment of Control Technology for Stationary Sources. Volume I: Technical Discussion.
Final rept.,
D. Minicucci, M. Herther, L. Babb, and W. Kuby. Feb 80, 198p ACUREX-79-360-VOL-1
Contract ARB-A7-170-30
See also Volume 2, PB80-192610.

The purpose of this project was to develop a reference document for use by the Air Resources Board, local air pollution control districts, and the U.S. Environmental Protection Agency that describes technological options available for the control of emissions from stationary sources located in California. Control technologies were examined for 10 industry groups and six air pollutants. Volume I, Technical Discussion, includes an overall introduction to the project, descriptions of its major elements, background information for each industry group addressed, and the project bibliography. In Volume II, Control Technology Data Tables, qualitative descriptions of control options for the various sources and quantitative information on control technology cost, efficiency, reliability, energy consumption, other environmental impacts, and application status are presented in tabular format. Also included is a code list that classifies the stationary sources examined by industry, process and emission source.

PB80-192610 PC **A99**/MF **A01**
Acurex Corp., Mountain View, CA. Energy and Environmental Div.
Assessment of Control Technology for Stationary Sources. Volume II: Control Technology Data Tables.
Final rept.,
D. Minicucci, M. Herther, L. Babb, and W. Kuby. Feb 80, 738p ACUREX-79-360-VOL-2
Contract ARB-A7-170-30
See also Volume 1, PB80-192602.

This report, the Control Technology Data Tables, is the second volume of the three-volume final report for the contract. It presents in tabular format, qualitative descriptions of control options for the various sources and quantitative information on control technology cost, efficiency, reliability, energy consumption, other environmental impacts and application status. Also included is a code list which classifies the stationary sources examined by industry, process, and emission source.

PB80-192743 PC **A03**/MF **A01**
GCA Corp., Bedford, MA. GCA Technology Div.
Summary of Group II Control Technique Guideline Documents for Control of Volatile Organic Emissions from Existing Stationary Sources.
Final rept.,
Stephen V. Capone, and Malcolm Petroccia. Feb 80, 36p GCA-TR-79-79-G, EPA-450/2-80-001
Contract EPA-68-02-2607
See also report dated Dec 78, PB-294 975.

Control Technique Guideline (CTG) documents have been prepared by the Office of Air Quality Planning and Standards of the U.S. EPA to assist states in defining reasonably available control technology (RACT) for the control of volatile organic compound emissions from existing stationary sources. A document (PB-294 975) summarizing the CTG documents issued prior to January 1978 (Group I) was published in December 1978. This document (PB80-192743) summarizes the CTG documents issued between January 1978 and January 1979 (Group II). A description of each source category is provided, along with RACT and costs to retrofit a model facility. The source categories included are: leaks from petroleum refinery equipment, surface coating of miscellaneous metal parts and products, manufacture of vegetable oil, surface coating of flat wood paneling, synthesized pharmaceutical products manufacturing, pneumatic rubber tire manufacturing, graphic arts (rotogravure and flexography), external floating roof tanks, perchloroethylene dry cleaning, and leaks from gasoline tank trucks and vapor collection systems.

PB80-192909 PC **A03**/MF **A01**
SRI International, Menlo Park, CA.
Sodar Network Support for LIRAQ Utilization in Conjunction with Project MABLE.
Final rept. Jun 78-Oct 79,
Phillip B. Russell. Oct 79, 44p SRI-8052, ARB-R-79/118
Contract ARB-A7-184-309

A network of six sodars (acoustic radars) was operated in the San Francisco Bay area from late July to early September 1978. The purpose of the network was to acquire inland mixing-depth data for use by the Bay Area Air Quality Management District in their studies of summer oxidant episodes in conjunction with data from Project MABLE. The sodar data from 28 July through 15 August were reduced to a digital form giving hourly mixing-depth estimates and surface-stability indicators. A computer code was developed to plot these data, thus giving an overview and facilitating comparisons among different sites, days, and times of day. Listings and plots of the digital data are shown and discussed. The importance of site selection and equipment maintenance to resulting sodar data quality is emphasized through examples.

PB80-192925 PC **A06**/MF **A01**
Washington Univ., Seattle. Dept. of Civil Engineering.
Monitoring by Aerial and Terrestrial Photogrammetry.
Final technical rept.,
S. A. Veress, and J. N. Hatzopoulos. Dec 79, 115p FHWA-WA-80-38.1
Sponsored in part by Washington State Dept. of Transportation, Olympia.

A photogrammetric monitoring method of structural deformation has been developed during the course of this project. The method is based on a combination of aerial and terrestrial photographs. The theoretical experimentation for formulation of computer programs has been done on mathematical models. The combination of aerial and terrestrial photographs provides a 30% increased accuracy if compared to terrestrial photographs only. Practical experimentation was done on the existing Gabion Wall and it was indicated that the achievable accuracy is 1/120,000 of the photographic distance. The method is flexible if it can be used for monitoring of any type of structure as well as for aerial triangulation.

PB80-192982 PC **A02**/MF **A01**
Houston Univ., TX.
Environmental Protection and the Tenth Five-Year Plan, (USSR),
Victor L. Mote. 1979, 24p

The principal measures to which the USSR state investments are directed are: pollution monitoring; pollution abatement (absorbing the majority of the money); comprehensive use of resources; environmental forecasting and impact analyses in the reconstruction, design and placement of industrial facilities, particularly in Siberia and the sub-arctic. All this clearly reflects a change in tone and, a higher respect for the environment in Soviet state planning, to wit: a rational-growth policy.

PB80-192990 PC **A12**/MF **A01**
California Inst. of Tech., Pasadena. Environmental Quality Lab.
Assessment of Alternative Strategies for Sludge Disposal into Deep Ocean Basins Off Southern California.
Final rept.,
George A. Jackson, Robert C. Y. Koh, Norman H. Brooks, and James J. Morgan. Sep 79, 271p EQL-14
Sponsored in part by Ford Foundation, New York, Rockefeller Foundation, New York, and Los Angeles/Orange County Metropolitan Area Project, Whittier, CA.

This study is part of EQL's ongoing research on the assessment of various strategies for ocean disposal of digested sewage sludge, with particular reference to the Southern California Bight.

PB80-193170 PC **A07**/MF **A01**
California Energy Commission, Sacramento.
Proceedings of the Load Management Customer Participation Workshop Held at Sacramento, California on October 16, 1979.
Final rept.,
Mary Lynn Schneider, and Jim McCluskey. Oct 79, 143p CAEC-70

The purpose of the workshop was to develop and exchange information on approaches for soliciting and maintaining participation in residential load control programs. Topics covered during the workshop included marketing load management as a new product, soliciting and maintaining participants in load management programs, and various rate incentives that have been used and proposed for such programs.

PB80-193204 PC **A06**/MF **A01**
American Petroleum Inst., Washington, DC.
A New Correlation of NH3, CO2, and H2S Volatility Data from Aqueous Sour Water Systems.
Final rept. 1976-77,
Grant M. Wilson. Apr 80, 112p EPA-600/2-80-067
Grant EPA-R-804364010
Prepared in cooperation with Brigham Young Univ., Provo, UT.

A new correlation model has been developed for calculating sour water equilibrium data at temperatures from 20C to 140C. The correlating equations in this new sour water equilibrium model have been used to obtain a computer program capable of handling various chemical and physical equilibria of NH3, CO2, and H2S in sour water systems including the effects of carboxylic acids on ammonia fixation and release by caustic addition. A bibliography of related literature data is included in the report.

PB80-193253 PC **A03**/MF **A01**
Acurex Corp., Mountain View, CA.
Air Pollution Control Device Configurations.
Consultant rept. (Final).

Mar 80, 48p CAEC-59, CAEC-300-80-003

This report presents an analysis of those candidate air pollutant abatement schemes identified previously by Acurex Corporation in the report 'Environmental Control Technologies for a Northern California Coal-Fired Power Plant' (300-039) for possible use on PG&E's proposed Montezuma 1 and 2 (previously called Fossil 1 and 2) electric generating plants. Emphasis is placed on the effects of the arrangement of the control components, namely the baghouse, selective catalytic reduction (SCR) and flue gas desulfurization (FGD) units. Three basic configurations were identified as workable arrangements. The configurations were analyzed with respect to their capital, operating and maintenance cost impacts, reliability implications, and overall system removal efficiencies. Since there is no actual experience reported for these configurations with coal-fired boilers, reliability and overall efficiency estimates were described qualitatively.

PB80-193600 PC **A20**/MF **A01**
Acurex Corp., Mountain View, CA.
Environmental Control Technologies for a Northern California Coal-Fired Power Plant.
Consultant rept.
Mar 80, 475p CAEC-63, CAEC-300-80-002
Prepared in cooperation with SCS Engineers, Long Beach, CA., and CH2M/Hill, San Francisco, CA.

The Pacific Gas and Electric Company is planning a coal-burning, 1600 MWe steam-electric power plant, Fossil 1 and 2. This report presents a technical assessment of pollution control methods for air, solid waste and water, including their interaction. The air pollution control techniques are evaluated with respect to emissions levels indicated by the California Air Resources Board, CARB, which are twice as stringent as current federal standards. The solid waste disposal study deals with disposal alternatives and associated environmental impacts and costs. Water management alternatives based on wet cooling towers as supplied by various water sources are presented.

PB80-193709 PC **A06**/MF **A01**
Acurex Corp., Mountain View, CA.
Assessment of H2S Control Technologies for Geothermal Power Plants.
Consultant rept. (Final).
Feb 80, 123p CAEC-57, CAEC,-300-80-004

This report analyzes techniques for controlling Hydrogen Sulfide (H2S) from geothermal development. H2S, a malodorous, toxic gas is emitted from power plant and well field operations. Several technologies for controlling H2S emissions from power plants are examined. The Hydrogen Peroxide Combination System, Stretford System and possibly EIC or Coury upstream controls appear capable of compliance with the emission limitations of 100 grams per hour per gross megawatt in 1980 (and 50 q/hr/(g) MW in 1985 or 1990) at the Geysers Dry stream field in Northern California. Potential controls for stacking are: (1) upstream abatement, (2) automated well operation, (3) computerized well-field operation (as of PG&E's Geysers Unit No. 15) and (4) further steamfield interconnection (cross-overs). H2S controls for liquid geothermal resources are largely in developmental or theoretical stages and greater efforts are needed to insure resource development with minimal environmental consequences.

PB80-193741 PC **A09**/MF **A01**
Economics, Statistics, and Cooperatives Service, Washington, DC. Economic Development Div.
Federal Programs Supporting Multicounty Substate Regional Activities: An Analysis.
Staff rept.,
J. Norman Reid, Jerome M. Stam, Susan E. Kestner, and W. Maureen Godsey. May 80, 185p

The report identifies and describes the 39 Federal programs supporting or inducing multicounty substate regional activities during the 1977-79 period. This includes both the multipurpose areawide units or regional councils, which generally are councils of governments (COG's), economic development districts (EDD's), or regional planning commissions (RPC's), as well as multicounty single purpose areawide units. Five criteria guided the selection of the programs: (1) Federal connection, (2) multicounty area focus, (3) planning and policy development focus, (4) local control, and (5) a continuing nature. The 1977-79 period was selected for analysis for two primary reasons. First, it covers the period since the 1977 survey of regional organizations was conducted by the U.S. Bureau of the Census (8). Second, it was deemed desirable to have more than a one year look at a phenomenon as complex as Federal substate regional programs.

PB80-193766 PC **A04**/MF **A01**
New Jersey Dept. of Transportation, Trenton. Div. of Research and Development.
Snowplowable Raised Reflective Pavement Markers at Hazardous Locations in New Jersey.
Final rept.,
Christopher R. Graf, and Arthur W. Roberts. Sep 79, 62p 80-011-4668, FHWA/NJ-80-011
Contract DOT-FH-11-9302

Snowplowable raised reflective pavement markers were installed at three hazardous sites in New Jersey--a winding two lane rural road, a two lane downhill approach to a circle, and one direction of a three lane curve. The major evaluative findings after one year of use are that: (1) total accidents were an average of 29 per year before and 31 during the first year after installation, (2) after one year of use the markers could be seen as far as 1,400 feet from a car with low beams on a dark road, (3) during the first year up to 9.5 percent of reflectors needed to be replaced, but no castings were damaged, (4) spacings should vary according to degree of road curvature, (5) the estimated installation costs at these sites varied from $20 to $26 per marker, and (6) the installation equipment design should be improved. Detailed methods and findings with comments can be found in the report.

PB80-193873 PC **A05**/MF **A01**
Hawaii Univ., Honolulu. Water Resources Research Center.
An Automatic Hydraulic Structure to Open Sand Plugs at Stream Mouths on O'Ahu.
Technical rept.,
Jon K. Nishimura, and L. Stephen Lau. Jun 78, 81p TR-117, W80-05537, OWRT-A-070-HI(2)
Contracts DI-14-34-0001-7026, DI-14-34-0001-8013

Numerous stream mouths on O'ahu are affected by sand berm blockages which prevent free flow of storm waters to the ocean and cause the stream water level to rise rapidly; often overflowing of the stream banks and flooding of adjacent land areas result. To avoid this hazard, removal of the sand blockage prior to the arrival of peak flood flows is necessary. An automatic hydraulic structure which utilizes early arriving storm waters to hydraulically erode the sand berm has been developed during this study. A hydraulic model study of a 1- to 15-scale Froudian model based on a generalized O'ahu prototype stream channel was conducted to test physically the conceptual structure design.

PB80-193980 PC **A02**/MF **A01**
Global Marine Development, Inc., Newport Beach, CA.
Waterborne Trash Recycling Plant Study. Volume I: Executive Summary.
Final rept. Sep 78-May 80,
Max Halebsky, J. Herrington, J. Schaff, J. Woodyard, and B. West. May 80, 24p GMDI-04090-001-VOL-1, MA-RD-940-80073
Contract DO-A01-78-3081
See also Volume 2, PB80-193998. Prepared in cooperation with SCS Engineers, Long Beach, CA. Also available in set of 3 reports PC E09, PB80-193972.

The feasibility of waterborne trash recycling and energy recovery facilities was investigated for combinations of three locations and four processes. The three locations were Seattle, Washington (sheltered bay site); San Diego, California (open ocean); and St. Louis, Missouri (pierside). The four processes were production of coarse refuse-derived fuel (RDF); compressed fluff RDF; low BTU gas via the PUROX pyrolysis process; and electric power. Ferrous metal was also recovered from the waste.

PB80-193998 PC **A08**/MF **A01**
Global Marine Development, Inc., Newport Beach, CA.
Waterborne Trash Recycling Plant Study. Volume II: Detailed Study.
Final rept. Sep 78-May 80,
Max Halebsky, J. Herrington, J. Schaff, J. Woodyard, and B. West. May 80, 154p GMDI-04090-001-VOL-2, MA-RD-940-80074
Contract DO-A01-78-3081
See also Volume 1, PB80-193980 and Volume 3, PB80-194004. Prepared in cooperation with SCS Engineers, Long Beach, CA.
Also available in set of 3 reports PC E09, PB80-193972.

The feasibility of waterborne trash recycling and energy recovery facilities was investigated for combinations of three locations and four processes. The three locations were Seattle, Washington (sheltered bay site); San Diego, California (open ocean); and St. Louis, Missouri (pierside). The four processes were production of coarse refuse-derived fuel (RDF); compressed fluff RDF; low BTU gas via the PUROX pyrolysis process; and electric power. Ferrous metal was also recovered from the waste.

PB80-194004 PC **A05**/MF **A01**
Global Marine Development, Inc., Newport Beach, CA.
Waterborne Trash Recycling Plant Study. Volume III: Appendices.
Final rept. Sep 78-May 80,
Max Halebsky, J. Herrington, J. Schaff, J. Woodyard, and B. West. May 80, 89p GMDI-04090-001-VOL-3, MA-RD-940-80075
Contract DO-A01-78-3081
See also Volume 2, PB80-193998. Prepared in cooperation with SCS Engineers, Long Beach, CA.
Also available in set of 3 reports PC E09, PB80-193972.

The feasibility of waterborne trash recycling and energy recovery facilities was investigated for combinations of three locations and four processes. The three locations were Seattle, Washington (sheltered bay site); San Diego, California (open ocean); and St. Louis, Missouri (pierside). The four processes were production of coarse refuse-derived fuel (RDF); compressed fluff RDF; low BTU gas via the PUROX pyrolysis process; and electric power. Ferrous metal was also recovered from the waste.

PB80-194012 PC **A03**/MF **A01**
Texas Dept. of Water Resources, Austin.
Development of Ground Water in the Houston District, Texas, 1970-74,
R. K. Gabrysch. Jan 80, 44p TDWR/R-241
Prepared in cooperation with Geological Survey, Reston, VA.

Total withdrawals of ground water in the Houston district increased 9 percent from about 488 million gallons per day (21.4 cubic meters per second) in 1970 to about 532 million gallons per day (23.3 cubic meters per second) in 1974. The average annual rate of increase from 1960 to 1969 was about 6.3 percent. During 1970-74, increases in pumpage occurred in the Houston, Katy, and NASA areas; decreases occurred in the Pasadena and Alta Loma areas; and the pumpage in the Baytown-La Porte and Texas City areas remained almost constant. Water levels continued to decline throughout the district during 1970-74, but the rate of decline generally was not as great as in previous years. The greatest declines in the past several years were in the Houston area, but the center of decline is still in the Pasadena and Baytown-La Porte areas.

PB80-194137 PC **A04**/MF **A01**
Office of Naval Research Scientific Liaison Group, APO San Francisco 96503.
Electrostatic Precipitation Research in Japan,
Leon H. Fisher. Apr 80, 60p

A review is provided of current Japanese research activities and trends involving the electrostatic removal of suspended particles, fumes, and mists from flowing gases. A general discussion of electrostatic precipitation principals and an historical overview of their application to pollution control is included. The background to Japanese interest in

electrostatic precipitation technology is reviewed, and matrix under which research in this area is carried out in Japan is described. Also, a detailed review is provided of the activities of the Institute of Electrostatics and of the Electrostatics Laboratory at the University of Tokyo. Listings are included of the names and addresses of Japanese manufacturers of electrostatic precipitation equipment and of Japanese researchers in this field.

PB80-194152 PC **A15**/MF **A01**
Environmental Protection Agency, Research Triangle Park, NC.
Standards Support and Environmental Impact Statement. Volume 1: Proposed Standards of Performance for Grain Elevator Industry.
Jan 77, 348p EPA-450/2-77-001A

Standards of performance to control particulate matter emissions from new and modified grain elevators in the U.S. are being proposed under section 111 of the Clean Air Act. The proposed standards limit emissions of particulate matter from the following affected facilities and their air pollution control devices: truck loading and unloading stations, railroad hopper car and boxcar loading and unloading stations, equipment at barge and ship unloading stations, barge and ship loading stations, all grain handling operations, and grain dryers. This document contains information on the grain elevator industry and emission control technology, a discussion of the selected emission limitations and the supporting data, and the alternatives which were considered, and analyses of the environmental and economic impacts of the proposed standards.

PB80-194202 PC **A03**/MF **A01**
JRB Associates, Inc., McLean, VA.
Controlling Hazardous Wastes Research Summary,
Mark Schaefer. May 80, 28p EPA-600/8-80-017
Contract EPA-68-01-4839

This brochure contains a concise description of EPA's hazardous wastes research program. The 3-part discussion focuses on hazardous wastes identification, emergency response, and long-term control technologies.

PB80-194236 PC **A07**/MF **A01**
North Carolina Water Resources Research Inst., Raleigh.
State Water Resource Planning and Policy in North Carolina,
Maynard M. Hufschmidt. Feb 80, 133p UNC-WRRI-79-143, W80-05516, OWRT-B-103-NC(1)

North Carolina State water resource planning activities were studied over a two year period to develop an improved strategy for future water resource planning that includes changes in organization and administration, program content, and methodology. Following a brief historical review of activities in the 1965-1975 period, current resource management is analyzed in terms of the legislative base and program content of activities, the organizational structure of planning and management, and the connection between State and Federal programs and activities. Study results reveal that North Carolina's water management program is undergoing a transition, but has yet to reflect the appropriate balance between water quantity and quality. Federal Government pressures for water pollution control continue to take away from other important problems and needs.

PB80-194327 PC **A11**/MF **A01**
California State Dept. of Transportation, Sacramento. Div. of Maintenance.
Development of the California Pavement Management System. Volume I. System Description.
Final rept.,
Charles Bartell, and Karl Kampe. Oct 78, 229p 627139, FHWA-CA-HM-7139-78-03
See also Volume 2, PB80-194335.

A Pavement Management System (PMS) has been developed to monitor deteriorating pavement, to disseminate repair strategy information, to substantiate cost-effective rehabilitation strategies, and to be used as a basis for managing existing pavements in the State highway system. PMS begins with a statewide pavement condition field survey taken every two years. This survey identifies the location, nature, severity, and extent of pavement problems so data from the survey together with costs, rehabilitation strategies, traffic data, highway classification data, and other information has been computerized. The computer follows an engineering logic process to identify an appropriate level of repair for pavement. Because of the characteristic differences in flexible and rigid pavement problems and remedies, each pavement type is treated separately in the PMS. The end product is a series of reports describing pavement condition, rehabilitation strategy, and cost; candidate projects for various highway programs; and alternative repair strategies. This information will be used as a basis for establishing the magnitude and character of the various highway programs, the priority of repair work, and the funding to provide a designated level of service for California.

PB80-194335 PC **A04**/MF **A01**
California State Dept. of Transportation, Sacramento. Div. of Maintenance.
Development of the California Pavement Management System. Volume 2. Manual of Rating Instructions.
Final rept.,
Fred Boucher. Oct 79, 65p 627139, FHWA-CA-HM-7139-78-04
See also Volume 1, PB80-194327.

The Pavement Management System uses data gathered every two years in a statewide pavement condition survey. This survey rates and measures physical condition and ride quality of all through lanes of the California State Highway System. A 'Manual of Rating Instructions for Pavement Condition Surveys' was developed in order to establish consistent pavement condition inventory. The manual is used for training and as a reference in the field. Consistent and accurate application of these guidelines is essential to a successful Pavement Management System.

PB80-194475 PC **A06**/MF **A01**
Environmental Protection Agency, Atlanta, GA. Region IV.
Upper Ocmulgee River Basin Water Quality Management Plan.
Draft environmental impact statement.
Apr 80, 122p EPA-904/9-80-049

The Draft Environmental Impact Statement (EPA 904/9-80-049) Upper Ocmulgee River Basin Water Quality Management Plan which includes Dekalb, Gwinnett, Walton, Rockdale, Newton, and Clayton Counties in Georgia has been prepared in response to the Action of approval of the First Edition, Upper Ocmulgee River Basin 303(e) Water Quality Management Plan. The strategy includes reduction in nonpoint source loadings through strict enforcement of existing laws and ordinances as well as implementation of the recommendations of the Atlanta Region and Statewide 208 Water Quality Management Plans.

PB80-194491 PC **A02**/MF **A01**
Environmental Protection Agency, Research Triangle Park, NC. Emission Standards and Engineering Div.
Standards Support (Final) and Environmental Impact Statement. Volume II: Promulgated Standards of Performance for Lime Manufacturing Plants.
Oct 77, 24p EPA-450/2-77-007B
See also Volume 1, PB-266 942.

Standards of performance for the control of particulate matter emissions from affected facilities at new and modified lime manufacturing plants are being promulgated under the authority of sections 111, 114, and 301(a) of the Clean Air Act, as amended. The standards would require that particulate matter emissions be reduced by over 99 percent below the uncontrolled levels, and by about 70 percent below the emission levels being achieved by existing sources controlled to meet typical State standards. Volume 1 discusses the proposed standards, and an analysis of the associated environmental and economic impacts is included in this document. This volume contains a summary of the public comments on the proposed standards and EPA's responses, as well as summary economic and environmental impact statements.

PB80-194525 PC **A09**/MF **A01**
Yale Univ., New Haven, CT. School of Forestry and Environmental Studies.
Activities of the American Public Relating to Animals. Phase II.
Final rept.,
Stephen R. Kellert. Apr 80, 185p
Contract DI-14-16-0009-77-056
See also Phase 1, PB80-138332.

This report describes the frequency of occurrence and participant characteristics of various activities of the American public relating to animals. The activities covered include hunting, fishing, trapping, birdwatching, zoological park, aquarium and natural history museum visitation, scientific study, photography, conservation organization membership, television viewing, reading, art, backpacking, off-road vehicle use, environmental activism, wildlife and domestic animal petownership, livestock production, and damage inflicted on humans by animals.

PB80-194632 PC **A07**/MF **A01**
Pacific Environmental Services, Inc., Santa Monica, CA.
Hydrocarbon Control Strategies for Gasoline Marketing Operations,
R. L. Norton, R. R. Sakaida, and M. M. Yamada. May 78, 128p EPA-450/3-78-017
Contract EPA-68-02-2606

This informational document provides basic and current descriptions of gasoline marketing operations and methods that are available to control hydrocarbon emissions from these operations. The three types of facilities that are described are terminals, bulk plants, and service stations. Operational and business trends are also discussed. The potential emissions from typical facilities, including transport trucks, are given. The operations which lead to emissions from these facilities include (1) gasoline storage, (2) gasoline loading at terminals and bulk plants, (3) gasoline delivery to bulk plants and service stations, and (4) the refueling of vehicles at service stations. Available and possible methods for controlling emissions are described with their estimated control efficiencies and costs. This report also includes a bibliography of references cited in the text, and supplementary sources of information.

PB80-194657 PC **A09**/MF **A01**
Research Corp. of New England, Wethersfield, CT.
Impact of New Source Performance Standards on 1985 National Emissions from Stationary Sources.
Final rept. Jul 74-Jul 76,
Thomas G. Hopper, and William A. Marrone. Apr 77, 177p EPA-450/3-76-017
Contract EPA-68-02-1382

The purpose of this document is to present the results of a study to determine the impact of new source performance standards on nationwide emissions. The work presented covers 14 potential pollutants from approximately 200 source categories for the year 1985. The results are being used by EPA as input to the development of an overall standard setting strategy. The report contains information regarding controlled and uncontrolled emission factors, State emission limitations, industrial capacity, utilization, growth and retirement rates. The results of this study have been published as three volumes which encompass ten separate documents. This document contains the main text and Appendices I through III of Volume I. All input/output variables and results are summarized and tabulated in this volume.

PB80-194889 PC **A03**/MF **A01**
Federal Highway Administration, Washington, DC.
Recessed Snowplowable Markers.
Summary rept.,
Charles W. Niessner. Mar 80, 28p FHWA-TS-80-225

Raised reflective pavement markers are currently being used in a number of States as a supplement to painted lines. In areas of little or no snow, these markers provide excellent wet-night delineation.

However, in areas of heavy snowplowing the markers are easily removed from the pavement by the plows. In an effort to provide markers in the snow belt areas, two different approaches have been followed. One is to protect the marker by means of a casing and allow the snowplow to either ride up over the marker or to depress the reflector into the casing. The second method is to place the marker in a groove so that the top of the reflector is below the pavement surface. This report summarizes the work that has been completed on the installation and evaluation of the recessed snowplowable markers. The evaluation indicates that the recessed reflector marker system is a feasible method of protecting the reflector from snowplow damage. After 4 years of service, this system has continued to provide a useable degree of wet-night delineation.

PB80-195027 PC **A13/MF A01**
Beck (R. W.) and Associates, Sacramento, CA.
Analysis of Expansion of the Pacific Northwest-Southwest Intertie System.
Contractor rept. (Final),
Apr 80, 277p CAEC-72, CAEC-500-80-020

Three proposals were reviewed for expanding transmission capacity between the Pacific Northwest and Southwest by 4300 MW (compared to the 3900 MW of existing line capacity) using currently available information. Additional studies and investigations are required to further define benefits and costs, but it appears that at least 2400 MW of additional interconnection is economically justified given current fuel costs of oil, coal, and nuclear generation, and ignoring likely future fuel cost escalation.

PB80-195043 PC **A12/MF A01**
Research Triangle Inst., Research Triangle Park, NC.
Bureau of Land Management's Environmental Studies Program for the South Atlantic Outer Continental Shelf Area. Conference/Workshop Proceedings Held at Atlanta, Georgia on October, 1975.
Final rept.
Feb 76, 252p BLM/YM/ES-76/03
Contract DI-AA550-CT6-5

The report is a summary of available related information and provides predictions of the effects of drilling (exploration and development) on the environment of the South Atlantic. In addition, scientists identified subject areas in which additional information was required for predictions of environmental effects of drilling. Recommendations were presented for baseline monitoring and studies to adequately determine the environmental effects of oil and gas exploration and development in the South Atlantic Outer Continental Shelf Area.

PB80-195092 PC **A17/MF A01**
Texas Dept. of Water Resources, Austin.
Streamflow and Reservoir-Content Records in Texas: Compilation Report, January 1889 through December 1975. Volume 1. Gaging Stations in the Canadian, Red, Sulphur, Cypress Creek, Sabine, Neches, Trinity, and San Jacinto Basins and Adjoining Coastal Basins,
John P. Dougherty. Feb 80, 387p TDWR/R-244-VOL-1
See also Volume 2, PB80-195100.
Also available in set of 3 reports PC E19, PB80-195084.

The primary purpose of this report is to present a complete compilation of available historical monthly streamflow and reservoir-content records which have been obtained in Texas, spanning an 87-year period from January 1889 through December 1975. The data compiled in this report represent a total of 825 gaging stations and consist of records of the monthly discharge of streams, canals, floodways, and end-of-month contents of reservoirs in Texas, summarized on a monthly and calendar year basis. Compiled are the records of 693 streamflow stations, 28 canal stations, 9 floodway stations, and 86 reservoir-content stations. Volume 1 contains gaging stations in the Canadian, Red, Sulphur, Cypress Creek, Sabine, Neches, Trinity, and San Jacinto Basins and adjoining coastal basins.

PB80-195100 PC **A14/MF A01**
Texas Dept. of Water Resources, Austin.
Streamflow and Reservoir-Content Records in Texas: Compilation Report, January 1889 through December 1975. Volume 2. Gaging Stations in the Brazos and Colorado Basins and Adjoining Coastal Basins,
John P. Dougherty. Apr 80, 314p TDWR/R-244-VOL-2
See also Volume 1, PB80-195092 and Volume 3, PB80-195118.
Also available in set of 3 reports PC E19, PB80-195084.

The primary purpose of this report is to present a complete compilation of available historical monthly streamflow and reservoir-content records which have been obtained in Texas, spanning an 87-year period from January 1889 through December 1975. The data compiled in this report represent a total of 825 gaging stations and consist of records of the monthly discharge of streams, canals, floodways, and end-of-month contents of reservoirs in Texas, summarized on a monthly and calendar year basis. The report consists of three volumes. Volume 2 contains gaging stations in the Brazos and Colorado Basins and adjoining coastal basins.

PB80-195118 PC **A15/MF A01**
Texas Dept. of Water Resources, Austin.
Streamflow and Reservoir-Content Records in Texas: Compilation Report, January 1889 through December 1975. Volume 3. Gaging Stations in the Lavaca, Guadalupe, San Antonio, Nueces, and Rio Grande Basins and Adjoining Coastal Basins,
John P. Dougherty. Apr 80, 328p TDWR/R-244-VOL-3
See also Volume 2, PB80-195100.
Also available in set of 3 reports PC E19, PB80-195084.

The primary purpose of this report is to present a complete compilation of available historical monthly streamflow and reservoir-content records which have been obtained in Texas, spanning an 87-year period from January 1889 through December 1975. The data compiled in this report represent a total of 825 gaging stations and consist of records of the monthly discharge of streams, canals, floodways, and end-of-month contents of reservoirs in Texas, summarized on a monthly and calendar year basis. Compiled are the records of 693 streamflow stations, 28 canal stations, 9 floodway stations, and 86 reservoir-content stations. In addition, streamflow records are shown for 7 stations in New Mexico and 1 each in the states of Oklahoma and Arkansas. Volume 3 contains gaging stations in the Lavaca, Guadalupe, San Antonio, Nueces, and Rio Grande Basins and adjoining coastal basins.

PB80-195134 PC **A04/MF A01**
Dunlap and Associates, Inc., Darien, CT.
Factors Contributing to the Retention of Seated Passengers During Emergency Stops.
Final rept. Nov 77-Jun 79,
Harold H. Jacobs. Mar 80, 75p DOT-TSC-UMTA-79-52, UMTA-MA-06-0048-79-6
Contract DOT-TSC-1314

In order to examine specific Automated Guideway Transit (AGT) developments and concepts, the Urban Mass Transportation Administration has undertaken a new program of studies and technology investigations known as the Automated Guideway Transit Technology (AGTT) Program. The objective of one segment of this program, the Systems Safety and Passenger Security (SS&PS) study, is the development of guidelines for the assurance of actual and perceived passenger safety and security in AGT systems. The prime objective of this deceleration and jerk research study was to provide AGT system planners, designers, and operators with guideline information on the acceleration levels at which seated AGT passengers might be expected to be thrown from their seats during emergency stops. A series of seven experiments was conducted to examine the variables that could contribute to a safe emergency stop on an AGT system. Sixty subjects, conforming to a desired range, experienced emergency decelerations in a test vehicle controlled by an automated braking system. The independent variables examined were seat contour and covering, seat orientation and tilt, footrests and armrests, and rate of change of deceleration (jerk). The dependent variables were the deceleration level at which subjects moved from sensors that were imbedded in the experimental seat and subject ratings.

PB80-195563 PC **A02/MF A01**
Wisconsin Univ.-Extension, Madison. Dept. of Engineering and Applied Science.
Design of Small-Craft Harbors for Ice Conditions,
C. Allen Wortley. Sep 79, 10p WIS-SG-79-702, NOAA-80051204
Pub. in Proceedings of Oceans, p401-406 Sep 79.

Great Lakes small-craft harbor structures are damaged by ice. Information obtained from extended winter observations in two hundred harbors is presented. This information, together with design experiences, field tests, laboratory tests, and literature reviews are used to prepare design recommendations for northern harbors.

PB80-195571 PC **A08/MF A01**
American Planning Association, Chicago, IL.
Protecting Solar Access: A Guidebook for California Communities.
Consultant rept. (Final),
Martin Jaffe. Mar 80, 175p CAEC-62, CAEC-500-80-013

The purpose of this manual is to show planners how to use conventional land use controls to protect solar access in new residential development for space heating and cooling and domestic hot water. Protecting solar access essentially means regulating development in such a way that buildings and vegetation do not block sunlight and prevent solar energy use by neighboring buildings. The principal audience for this manual is the professional land use planner, who provides technical assistance to his or her community in the planning and regulation of development. The manual provides technical information about the drafting of land use controls and the development of comprehensive plans for solar energy development. Municipal attorneys, who must review and assist in the drafting of land use controls, will find this manual a useful guide for technical drafting of solar access amendments and regulations.

PB80-195787 PC **A05/MF A01**
Datagraphics, Inc., Pittsburgh, PA.
The Feasibility of a Regional Industrial Wastewater Treatment Facility.
Final rept. 8 Dec 75-30 Nov 78,
Henry C. Bramer, and Charles A. Caswell. Apr 80, 80p EPA-600/2-80-065
Grant EPA-R-804182

The feasibility of establishing a regional industrial wastewater treatment (RWT) facility to serve the 68 industrial plants along the lower reaches of the Monongahela River has been studied. It has been concluded that a facility consisting of an interceptor sewer system following the river course with a treatment plant near the point at Pittsburgh is technically possible. The facility would best be designed to treat up to 568,000 cubic meters per day (cu m/day) (150 million gallons per day (mgd)) of wastewater.

PB80-196140 PC **A03/MF A01**
Pennsylvania Univ., Philadelphia.
Self-Sustaining Public Transportation Services. Volume I. Guidelines for Implementation.
Final rept.,
Edward K. Morlok, and Philip A. Viton. Nov 79, 42p UMTA-PA-11-0017-80-1
See also Volume 2, PB80-196157.

These guidelines are based on examination of three self-supporting, or nearly self-supporting, public transportation services. The three systems studied were: the express bus routes operated wholly within the City of New York, the Chicago and North Western Railway's suburban service, and the PATCO Hi-Speed Line from Philadelphia to Lindenwold, New Jersey.

PB80-196157 PC **A11/MF A01**
Pennsylvania Univ., Philadelphia.
Self-Sustaining Public Transportation Services. Volume II. Technical Report.
Final rept.,
Edward K. Morlok, Philip A. Viton, Palaniappan Sudalaimuthu, Joseph Waldo, and M. Suleiman Hessami. Nov 79, 239p UMTA-PA-11-0017-80-2

See also Volume 1, PB80-196140.

The study examines three systems of urban transportation services which are self-sustaining (cover at least operating costs from the farebox). The three systems selected for the study are: (1) the Philadelphia-Lindenwold Hi-Speed Line, a rail rapid transit line operated by the Port Authority Transit Corporation (PATCO); (2) the express bus services in the City of New York, with routes operated by both the Metropolitan Transit Authority as well as private bus companies; and (3) the suburban railroad service in the Chicago metropolitan area of the Chicago and Northwestern Transportation Company (formerly C&NW Railway). These services are characterized by high fares; high service quality including a high probability of obtaining a seat and attention to consumer comfort and safety; travel times comparable to those on alternative modes, including the private car; service between residential areas and CBDs; market areas composed primarily of middle-to upper-income inhabitants; and costs not necessarily lower than comparable service by other operators. All three, until recently, have covered at least operating costs from the farebox. That two of them no longer do so is attributable to explicit policy decisions, and not to a failure in the viability of the service. The research concludes that although self-sustaining services are clearly appropriate only for certain markets, within those markets they have potential as a means of relieving the increasing scale of transit deficits.

PB80-196322 PC **A09**/MF **A01**
Wilmington Metropolitan Area Planning Coordinating Council, Newark, DE.
The Development of Service Standards and Operating Guidelines for the Delaware Authority for Regional Transit. Task B of the DART Planning Program.
Research rept. (Final) 1978-79.
Nov 79, 194p UMTA-IT-09-0061-80-1
Prepared by Barton-Aschman Associates, Inc., Washington, DC.

The service standards project is one aspect of the Delaware Authority for Regional Transit (DART) planning program in order to increase DART's patronage, improve DART's operational efficiency, and increase the regional transit accessibility with the Wilmington urbanized area. Although these standards and guidelines are intended initially for application only to DART operations, they have been developed in such a way as to allow their application in any portion of the New Castle County, Delaware-Cecil County, Maryland-Salem County, New Jersey SMSA. This report presents an introduction and background of transit performance measurement, a detailed description of the transit service standards and operating guidelines proposed for adoption by DART, and an assessment of the degree to which DART's current operations are in compliance with the suggested standards and basic planning guidelines. In addition, a preliminary estimate of the costs required to have DART's service meet these proposed standards and guidelines is included.

PB80-196330 CP **T11**
Federal Highway Administration, Washington, DC.
Rural Highway Planning System.
Software,
Leon E. Litz, and Bennett Rutledge. 15 Sep 79, mag tape FHWA-EO-79-1010, DOT/DF-80/001
See also Spanish package, PB80-196397.
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB80-196355, PB80-196363, PB80-196371, and PB80-196389.

An effective highway transportation planning process is the basis for, and is a necessary continuous part of, efficient highway transportation management. A series of manuals and accompanying computer programs were developed to provide guidelines for establishing a system and the basic data collection programs and analysis that are a necessary beginning for accomplishing such a planning process. This software package has been developed to analyze the data that will be collected by following the instructions described in the Road Inventory, Traffic Surveys, and Adequacy Rating Manuals. The computer programs are described and documented in the 'Computer Program Users Manual,' Vols. 1, 2 and 3. This battery of software includes 21, 7 and 12 programs for analyzing the road inventory, traffic survey, and adequacy rating data, respectively. Included with the computer programs are test data for each program and sample outputs which should be of great assistance while installing the programs. Programs included in the package provides means for storing, editing, and reporting such basic data. Special provisions have been made for easy conversion of titles to most foreign languages. Highway Log reports include Route Lengths. Mileage Summaries by pavement type, Summaries of highway structures, and Route logs. Adequacy reports include road adequacy ratings, and an improvement priority analysis. Traffic survey reports include peak hourly Volumes, Average daily traffic, Vehicle classification summaries, truck axle loading, and commodity flow analyses...Software Description: The Program is written in the COBOL-ANSI 74 programming language for implementation on a IBM computer using the OS/MVT 21.8F operating System. 126K bytes of core storage are required to operate the system.

PB80-196355 PC **E13**/MF **A01**
Federal Highway Administration, Washington, DC.
Rural Highway Planning System. Computer Program Users' Manual. Volume 1,
Leon E. Litz, John Cutrell, and Kathleen Centeno. 1977, 272p FHWA-EO-79-1007, DOT/DF-80/001A
See also Volume 2, PB80-196363. For system on magnetic tape, see PB80-196330.
Also available in set of 3 reports PC E99, PB80-196348.

An effective highway transportation planning process is the basis for, and is a necessary continuous part of efficient highway transportation management. A series of manuals and accompanying computer programs were developed to provide guidelines for establishing a system and the basic data collection programs and analysis that are a necessary beginning for accomplishing such a planning process. The object of the manual is to assist with the development of efficient procedures for analyzing the road inventory data beginning with the receipt of the completed field forms. It includes a suggested organization for office operations and documentation to assist with the installation and use of the computer programs that were developed for the system.

PB80-196363 PC **E14**/MF **A01**
Federal Highway Administration, Washington, DC.
Rural Highway Planning System. Computer Program Users' Manual. Volume 2,
Leon E. Litz, and Bennett Rutledge. 1978, 189p FHWA-EO-79-1008, DOT/DF-80/001B
See also Volume 1, PB80-196355, and Volume 3, PB80-196371. For system on magnetic tape, see PB80-196330.
Also available in set of 3 reports PC E99, PB80-196348.

An effective highway transportation planning process is the basis for, and is a necessary continuous part of efficient highway transportation management. A series of manuals and accompanying computer programs were developed to provide guidelines for establishing a system and the basic data collection programs and analysis that are a necessary beginning for accomplishing such a planning process. The object of the manual is to assist with the development of efficient procedures to update the road inventory data and for analyzing adequacy rating data beginning with the receipt of the completed field forms. The tables produced as a result of this analysis are used for determining the highway needs.

PB80-196371 PC **E13**/MF **A01**
Federal Highway Administration, Washington, DC.
Rural Highway Planning System. Computer Program Users' Manual. Volume 3,
Leon E. Litz, and Bennett Rutledge. 1979, 215p FHWA-EO-79-1009, DOT/DF-80/001C
See also Volume 2, PB80-196363. For system on magnetic tape, see PB80-196330.
Also available in set of 3 reports PC E99, PB80-196348.

An effective highway transportation planning process is the basis for, and is a necessary continuous part of efficient highway transportation management. A series of manuals and accompanying computer programs were developed to provide guidelines for establishing a system and the basic data collection programs and analysis that are a necessary beginning for accomplishing such a planning process. The object of the manual is to assist with the development of efficient procedures to update the road traffic data (volume, classification and weight) beginning with the receipt of the completed field forms.

PB80-196389 PC **E99**/MF **A01**
Federal Highway Administration, Washington, DC.
Outline of the Highway Transportation Planning Process,
Leon E. Litz, David Toillion, John Cutrell, Ronald Hall, and Bennett Rutledge. 1980, 243p FHWA-EO-79-1000, DOT/DF-80/001D
See also Spanish version, PB80-196405. For system on magnetic tape, see PB80-196330.

An effective highway transportation planning process is the basis for, and is a necessary continuous part of efficient highway transportation management. This series of manuals and accompanying computer programs were developed to provide guidelines for establishing a system and the basic data collection programs and analysis that are a necessary beginning for accomplishing such a planning process. The following manuals are included: (1) Outline of the highway transportation planning process, (2) Guide for a manual of instructions for road inventory, (3) Guide for a manual of instructions for traffic surveys, (4) Guide for a functional classification of highways, (5) Guide for a manual for highway adequacy rating, and (6) Measuring highway improvement needs and priority analysis.

PB80-196488 PC **A23**/MF **A01**
Environmental Protection Agency, Washington, DC. Effluent Guidelines Div.
Development Document for Existing Source Pretreatment Standards for the Electroplating Point Source Category.
Final rept.,
J. Bill Hanson. Aug 79, 531p EPA-440/1-79/003

This report presents the findings of an extensive study of electroplating processes for the purpose of developing pretreatment standards for existing point sources discharging to publicly owned treatment works (POTW) to implement Section 307 (b) of the Clean Water Act, as amended (33 U.S.C. 1317 (b), which requires the establishment of pretreatment standards for pollutants introduced into publicly owned treatment works (POTWs). This regulation is also being promulgated in compliance with the Settlement Agreement in Natural Resources Defense Council, Inc. v. Train, 8 ERC 2120 (D.D.C. 1976), as modified March 9, 1979. This study presents pretreatment standards for the entire electroplating point source category for existing sources discharging to municipal treatment systems. Pretreatment standards for existing sources presented in this document describe the degree of effluent reduction attainable through the application of the best practicable control technology currently available and do not account for the further incidental treatment to be performed by municipal treatment systems.

PB80-196579 PC **A06**/MF **A01**
Texas Transportation Inst., College Station.
Crash Tests and Evaluation of Highway Appurtenances. Volume 1. Sign and Luminaire Supports.
Final rept. 27 Jun 74-Sep 77,
C. E. Buth, G. R. Samuelson, and R. M. Olson.
Sep 79, 102p FHWA-RD-79-92
Contract DOT-FH-11-8509
See also Volume 2, PB80-196587.
Also available in set of 3 reports PC E11, PB80-196561.

The research program reported consisted of full-scale vehicle crash tests and evaluation of a roadside sign and two kinds of luminaire supports. This program was conducted to evaluate certain pieces

of hardware and provide data for validation of theory and correlation with laboratory tests. Two tests were conducted on a 12 ft (3.7 m) by 24 ft (7.3 m) roadside sign. The sign was mounted on two 12 in. (305 mm) by 45 lb/ft (67 kg/m) wide flange support posts with bolted breakaway bases. Two tests were conducted on 30 ft (9.1 m) tapered aluminum poles with cast aluminum flange bases, and two were conducted on similar poles mounted on cast aluminum transformer bases. In a series of seven tests, tapered steel luminaire supports with bolted breakaway bases were tested.

PB80-196587 PC **A09**/MF **A01**
Texas Transportation Inst., College Station.
Crash Tests and Evaluation of Highway Appurtenances. Volume 2. Impact Attenuators.
Final rept. 27 Jun 74-Sep 77,
C. E. Buth, G. R. Samuelson, and R. M. Olson.
Sep 79, 187p FHWA-RD-79-93
Contract DOT-FH-11-8509
See also Volume 1, PB80-196579, and Volume 3, PB80-196595.
Also available in set of 3 reports PC E11, PB80-196561.

The report presents results of a program of full-scale testing and evaluation of crash attenuators. The attenuators studied were: (1) corrugated steel pipe attenuator, (2) scrap tire attenuator, (3) Eyring attenuator, (4) tire/sand attenuator, and finally two tests were conducted to determine the effects of curbs on vehicle trajectory.

PB80-196595 PC **A05**/MF **A01**
Texas Transportation Inst., College Station.
Crash Tests and Evaluation of Highway Appurtenances. Volume 3. Median Barriers and Terminals.
Final rept. 27 Jun 74-Sep 77,
C. E. Buth, G. R. Samuelson, and R. M. Olson.
Dec 79, 78p FHWA-RD-79-94
Contract DOT-FH-11-8509
See also Volume 2, PB80-196587.
Also available in set of 3 reports PC E11, PB80-196561.

The report describes full-scale vehicle impact tests on a median barrier and a terminal for median barriers. The median barrier consisted of two standard corrugated sheet steel beams (W-sections) mounted on the ends of spacers which were in turn mounted on the top of weak posts. This barrier was developed in Europe and has been referred to generically as the SWOV or NEHER barrier. One full-scale 'strength' test (4500-lb (2043 kg), 60 mph (97 km/hr), 25 deg) was conducted on each of two versions of this design. Although each barrier received extensive damage and loose components were thrown into opposing traffic lanes, both barriers contained and redirected the test vehicle in each test.

PB80-196694 PC **A03**/MF **A01**
North Carolina State Univ. at Raleigh. Sea Grant Coll. Program.
A Study of Federal and State Legislation Concerning the Construction of Proposed Oil Refineries.
Working paper,
Cy Grant, and Thomas W. Earnhardt. Feb 80,
33p UNC-SG-WP-80-02, NOAA-80051401
Grant NA79AA-D-00048

Two oil refineries are proposed for construction in Brunswick and Carteret counties, North Carolina. The economic benefits to the coastal area will be substantial. These benefits are welcome by county officials, chamber of commerce members, and state government officials. Yet, environmentalists, citizens, and state officials wish to insure that the operations are as safe as possible. To assist in shedding some light on the possible problems, this study examines how effectively federal and state regulations relative to the construction and operation of oil refineries, assess and alleviate any possible adverse impacts. Any deficiencies in the regulations are identified and possible solutions are discussed.

PB80-196777 PC **A07**/MF **A01**
Berkshire County Regional Planning Commission, Pittsfield, MA.
Berkshire Regional Transit Authority: Transportation System Management Evaluation Report,
C. W. Cook. Oct 79, 145p UMTA-MA-09-0050-80-1

Many transit operators have a need for an evaluation system which can measure existing service performance. To assist these operators, UMTA has been funding, through its Section 8 Technical Studies Program, local studies in service evaluations. The purpose of these studies is to evaluate existing transit service and to develop recommendations and plans for service improvements. This document summarizes the local evaluation study of the transit service provided by the Berkshire Regional Transit Authority (BRTA) in Pittsfield, Massachusetts. The purpose of the study was to review and evaluate the current transit services provided by the BRTA and to develop recommendations for service modifications which utilize low cost techniques to improve operating effectiveness. In this study, emphasis is on the three new routes in Pittsfield, the overall fare structure, and the priority locations for bus stop shelters. To collect the necessary information for this evaluation, a loading survey was conducted. This survey provided information on maximum loading, hourly ridership, passenger miles of travel and average trip length by route. The report serves as an excellent example of service evaluation within a small transit system.

PB80-197320 PC **A15**/MF **A01**
Municipal Environmental Research Lab., Cincinnati, OH. Wastewater Research Div.
Carbon Adsorption Isotherms for Toxic Organics.
Research rept. Aug 72-Mar 80,
Richard A. Dobbs, and Jesse M. Cohen. Apr 80,
332p EPA-600/8-80-023

An experimental protocol for measuring the activated carbon adsorption isotherm was developed and applied to a wide range of organic compounds. Methods for treatment of the isotherm data and a standard format for presentation of results are shown. In the early phase of the study selection of compounds for testing in the experimental program presented a formidable task. Initial selections were based on the following criteria: (1) annual quantity produced, (2) critical concentration required to produce an adverse environmental effect, (3) probability of occurrence in water or wastewater, (4) persistence in the water environment, and (5) solubility. During the course of the study the Occupational Safety and Health Administration's (OSHA) list of regulated carcinogens and the U.S. Environmental Protection Agency's Consent Decree list of priority pollutants were developed. These compounds were added to those previously selected for the experimental phase of the study.

PB80-197361 PC **A11**/MF **A01**
Environmental Sciences Research Lab., Research Triangle Park, NC. Meteorology and Assessment Div.
User's Guide for MPTER, A Multiple Point Gaussian Dispersion Algorithm with Optional Terrain Adjustment,
Thomas E. Pierce, and D. Bruce Turner. Apr 80,
250p EPA-600/8-80-016

The information presented in this user's guide is directed to air pollution scientists interested in applying air quality simulation models. MPTER is the designation for Multiple Point source algorithm with TERrain adjustments. This algorithm is useful for estimating air quality concentrations of relatively nonreactive pollutants; hourly estimates are made using the Gaussian steady-state model. The algorithm is most applicable for source-receptor distances less than 10 km and for locations with level or rolling terrain where a single wind vector for each hour adequately approximates the flow over the source and receptor sites. The terrain adjustment option is limited in application to receptors whose elevation is no higher than the lowest stack top elevation of the sources considered. Calculations are performed on the hourly meteorological data that the model requires: wind direction, wind speed, temperature, stability class, and mixing height. Emission information required of the point sources are source coordinates, emission rate, physical height stack diameter, stack gas exit velocity, and stack gas temperature. In addition to terrain adjustment, options are available for stack downwash, gradual plume rise, and buoyancy-induced dispersion. All printed output is optionally available so the user can avoid unneeded output volume. General information is contained in the Executive Summary and the first three chapters. The technical basis for the algorithm is given in Chapter 4 and Appendices A and B. The remaining material herein relates to use and understanding of the computer program for the algorithm.

PB80-197544 PC **A10**/MF **A01**
PEDCo-Environmental, Inc., Cincinnati, OH.
Control Techniques for Lead Air Emissions. Volume I: Chapters 1-3.
Final rept.,
David M. Augenstein, Tom Corwin, Robert Hearn, Vishnu Katari, and James Sperber. Dec 77, 214p EPA-450/2-77-012-A
Contract EPA-68-02-1375
See also Volume 1, Chapter 4 - Appendix B, PB80-197551.

This report documents atmospheric emissions of lead (Pb) and its compounds from various sources, methods for controlling these emissions, and approximate costs for implementing these control methods. Estimates of energy and environmental impacts are given for specific model plants.

PB80-197551 PC **A16**/MF **A01**
PEDCo-Environmental, Inc., Cincinnati, OH.
Control Techniques for Lead Air Emissions. Volume II: Chapter 4 - Appendix B.
Final rept.,
David M. Augenstein, Tom Corwin, Robert Hearn, Vishnu Katari, and James Sperber. Dec 77, 370p EPA-450/2-77-012-B
Contract EPA-68-02-1375
See also Volume 1, Chapters 1-3, PB80-197544.

This publication describes sources of atmospheric lead (Pb) emissions in the United States and deals with methods of emission control and estimated costs of controls. Lead emissions have been almost ubiquitous in this country and have arisen from automobiles, the metallurgical industry, fuel combustion, and many lead-using manufacturing processes. Gasoline combustion contributed 90.4 percent of the 141.4 Gg (155,900 tons) total lead emissions in 1975. The next largest lead emitters were waste oil disposal, primary copper smelting, and solid waste incineration. Significant sources of fugitive lead emissions are primary nonferrous smelters and secondary lead smelters. Lead emissions from gasoline have consisted mostly of lead oxides; lead alkyl manufacture emits small amounts of those alkyls as vapors. Control of lead emissions from automobiles is being achieved by reduction or elimination of lead in gasoline. Particulate lead emissions from industry are being controlled by electrostatic precipitators and fabric filters, up to efficiencies of about 99.5 and 99.9 percent, respectively. Scrubber efficiencies can reach 99 percent at the expense of high power usage. Cost data on lead emission controls is limited; therefore, for most industrial sources, model plants were described, and equations were derived for capital and annualized costs, based on exhaust flow rate and annual labor hours. Appendix B of the document shows how the equations may be adjusted to apply to either new or retrofit construction.

PB80-197569 PC **A09**/MF **A01**
Little (Arthur D.), Inc., Cambridge, MA.
Supercritical Fluid Regeneration of Activated Carbon for Adsorption of Pesticides.
Final rept. Jan 77-May 79,
R. P. DeFilippi, V. J. Kyukonis, R. J. Robey, and M. Modell. Mar 80, 198p EPA-600/2-80-054
Grant EPA-R-804554

The report describes the development of a new process for regenerating activated carbon, using supercritical CO2 as a desorbent. Supercritical CO2 in the range of 30-250 C and at pressures > 80 atm. is a good solvent for organics. A series of pesticides was tested for treatment by carbon adsorption and supercritical CO2 regeneration. Alachlor and atrazine, selected for further study, both permitted regeneration over multiple cycles with a low average loss per cycle. All pesticides

tested showed a substantial capacity decline (30-plus%) after one generation, but after several cycles both alachlor and atrazine exhibited a stable working capacity. Regeneration is rapid. Water in the carbon pores is not detrimental, at least not at 120 C. Shorter exposure time of carbon to adsorbent resulted in less first-cycle decline. Desorption rates increased increased with temperature, and higher regeneration pressures (150-275 atm.) gave improved regenerability. Treatability studies on a plant sample of atrazine manufacturing wastewater indicated a stable but low working capacity of carbon. Working capacities of 0.05 to 0.08 g TOC per g carbon were obtained at regeneration pressures of 150-275 atm. at 120 C.

PB80-197577 PC **A08**/MF **A01**
California Univ., Berkeley. Dept. of Chemical Engineering.
Solvent Extraction of Wastewaters from Acetic-Acid Manufacture.
Final rept. 1 Jun 75-30 Sep 78,
N. Lawrence Ricker, and C. Judson King. Apr 80, 171p EPA-600/2-80-064
Grant EPA-R-803773

Solvent extraction was evaluated as a potential treatment method for wastewaters generated during the manufacture of acetic acid. Possible goals for an extraction process were considered. For the wastewater samples studied, extraction appeared to be too expensive to be practical unless recovery of a marketable chemical were possible. Long-chain, tertiary alkyl amines, dissolved in organic diluents, appeared to be the most promising extractants, except for certain wastewaters containing chlorinated acetaldehydes. Amine extractants were studied extensively in small-scale experiments to determine phase equilibria, extractant regenerability, mass-transfer characteristics, and emulsification tendencies. A cost estimate was prepared for an extraction process to recover acetic acid from a 22,700-kg/h (100-gpm) wastewater containing 5 wt.% acid. Estimated direct-fixed-capital was $1,030,000, with an annual operating cost of $253,000/year ($5.90/1000 gal), resulting in a return on investment before taxes (ROIBT) of 244% per year. The ROIBT, for a 1 wt.% acetic acid wastewater was only about 30%; however, this might be increased by further optimization of the amine/diluent combination.

PB80-197999 PC **A04**/MF **A01**
Union Carbide Corp., Tarrytown, NY.
Caprolactam Recovery from Aqueous Manufacturing Streams.
Final rept. 1 May 75-28 Feb 78,
John H. Dibble. Apr 80, 59p EPA-600/2-80-062
Grant EPA-R-803737

Pilot-plant runs using plant samples have demonstrated the feasibility of a novel extraction process for caprolactam recovery from dilute aqueous solutions. Following extraction, aqueous effluent caprolactam concentrations as low as 30 ppm were obtained. Further effluent treatment by activated carbon adsorption reduced the level to less than 2 ppm. In contrast, the commercial multi-effect evaporation process is less economical because much more water is vaporized and the condensate typically contains up to 0.1-0.2 weight percent caprolactam. Various physical properties were determined. In particular, vapor pressures for the key components were determined using a special high-temperature, low-pressure (vacuum) apparatus designed specifically for this application.

PB80-198302 PC **A06**/MF **A01**
Office of Technology Assessment, Washington, DC.
Ocean Margin Drilling: A Technical Memorandum.
May 80, 125p OTA-TM-0-4
Library of Congress catalog card no. 80-600083.

This report was prepared in response to a request from the Chairman and the Ranking Minority Member of the HUD-Independent Agencies Subcommittee of the Senate Appropriations Committee. It provides an evaluation of the Ocean Margin Drilling Program, a major new public-private cooperative research effort in marine geology proposed by the National Science Foundation. The study discusses the scientific merit of the program, possible alternatives to the present program plan, problems associated with technology development, aspects of petroleum company participation in the program, and government management considerations.

PB80-198500 PC **A08**/MF **A01**
Lockheed Electronics Co., Inc., Las Vegas, NV. Remote Sensing Lab.
Multispectral Techniques for Remote Monitoring of Sediment in Water: A Feasibility Investigation,
Ronald J. Holyer. Mar 80, 173p EPA-600/4-80-019
Contract EPA-68-03-2153

A data acquisition and analysis program has been undertaken to demonstrate the feasibility of remote multispectral techniques for monitoring suspended sediment concentrations in natural water bodies. Two hundred surface albedo measurements (400 to 1,000 nanometers) were made at Lake Mead with coincident water sampling for laboratory analysis. Water volume spectral reflectance was calculated from the recorded surface albedo, and volume reflectance-suspended sediment relationships were investigated. Statistical analysis has shown that quantitative estimates of nonfilterable residue (105C) and nephelometric turbidity can be made from volume spectral reflectance data with sufficient accuracy to make the multispectral technique feasible for sediment monitoring.

PB80-198526 PC **A04**/MF **A01**
South Carolina Univ., Columbia. Dept. of Chemistry.
Evaluation of Solid Adsorbents for Collecting Atmospheric Chlorinated Hydrocarbons,
Terry F. Bidleman, W. Neil Billings, and Charles G. Simon. Jul 80, 67p EPA-600/2-80-167
Grant EPA-R-804716

The comparative efficiency of polyurethane foam (PUF) and Tenax-GC resin for collecting polychlorinated biphenyls (PCB) and chlorinated pesticides from 300-1600 cu m air was determined by side-by-side sampling with each adsorbent in the city of Columbia, South Carolina.

PB80-198690 PC **A06**/MF **A01**
Science Applications, Inc., Los Angeles, CA.
An Inventory of Carcinogenic Substances Released into the Ambient Air of California. Volume I - Final Report: Screening and Identification of Carcinogens of Greatest Concern (Task I and III),
L. Margler, R. Ziskind, M. Rogozen, and M. Axelrod. 19 Feb 79, 104p SAI-068-80-504
Contract ARB-A7-161-30
See also Final rept. on Task 2 and 4, PB80-198708.

This report identifies eleven candidate carcinogenic substances released into the ambient air of California. These selected substances, related to mining and manufacturing industries in California, were the consensus of the authors, after reviewing published lists, rankings and assessments of national scope, applying additive and multiplicative algorithms to further screen the original list of potential candidates, and after final critiquing of 22 candidate substances by a panel of experts convened by SAI. Those substances which had no significant use in the state were deleted. Ubiquitous substances as nitrous acid, nitric oxide and secondary amines, considered precursors to the formation of nitrosamines, were likewise not considered because of uncertainties in the importance of their link to the carcinogenic compounds. The eleven substances of concern in California are: arsenic, asbestos, benzene, cadmium, carbon tetrachloride, chloroform, ethylene dibromide, ethylene dichloride, nitrosamines, perchloroethylene and polycyclic organic material (POM).

PB80-198708 PC **A14**/MF **A01**
KVB, Inc., Tustin, CA.
An Inventory of Carcinogenic Substances Released Into the Ambient Air of California. Final Report -Task II and IV,
R. M. Roberts. Mar 80, 325p KVB-26900-636, ARB-R-80/120
Contract ARB-A7-167-30
See also report on Tasks 1 and 3, PB80-198690. Prepared in cooperation with Science Applications, Inc., Los Angeles, CA.

Task II of this report locates suspected California sources of the eleven candidate carcinogenic materials identified in Volume I and inventories the emissions. Task IV discusses in considerable detail methodologies for the sampling and assaying of the candidate carcinogens. Seventeen prime emission sources are identified in Task II including a major steel mill, several refineries and chemical manufacturers, secondary smelters, power utilities and asbestos mining and manufacturing operations. Annual estimated emissions range from 1.5-150 tons per year. Three candidate materials, chloroform, ethylene dibromide and nitrosamines are either emitted in insignificant amounts or are emitted by area sources not amenable to sampling within the confines of the project. Generally, recommended sampling for the remaining compounds utilize the Environmental Protection Agency's Method 5 sampling train, modified for certain materials. Recommended analytical methods include gas chromatography, mass spectrometry, high performance liquid chromatography or a combination of these methods, including photometry. Atomic absorption utilizing graphite furnaces may be used for metals analysis. Methods for the sampling and analysis for arsenic, asbestos and polycyclic organic materials (POM) require special considerations.

PB80-199045 PC **A07**/MF **A01**
Environmental Protection Agency, Research Triangle Park, NC. Office of Air Quality Planning and Standards.
Compilation of Air Pollutant Emission Factors, Third Edition (Including Supplements 1-7). Supplement No. 10.
Feb 80, 147p AP-42-ED-3-SUPPL-10
See also Supplement no. 9, PB-295 614.

In this Supplement to AP-42, new, revised and updated emissions data are presented for mobile sources; aircraft; transportation and marketing of petroleum liquids; waste solvent reclamation; tank and drum cleaning; hydrofluoric acid; phosphoric acid; sulfur recovery; wine making; harvesting of grain; primary lead smelting; coal cleaning; glass fiber manufacturing; phosphate rock processing; coal conversion; taconite ore processing; plywood veneer and layout operations; woodworking waste collection operations; and explosives detonation. There is also an expansion and revision of the Appendix A, miscellaneous data and conversion factors.

PB80-199813 PC **A13**/MF **A01**
Industrial Environmental Research Lab., Research Triangle Park, NC.
Proceedings: Industry Briefing on IERL-RTP Lime/Limestone Wet Scrubbing Test Programs (5th) (December 1979),
John E. Williams. Jun 80, 287p EPA-600/9-80-032, IERL-RTP-1059
See also report dated Mar 79, PB-296 517.

The proceedings document presentations made during the December 5, 1979, industry briefing conference which dealt with the status of EPA/IERL-RTP's flue gas desulfurization (FGD) research, development, and application programs. Subjects considered included: lime/limestone scrubbing test results involving the organic buffer, adipic acid; limestone type and grind tests at IERL-RTP's pilot plant; IERL-RTP's program on waste solids disposal; the TVA/Shawnee lime/limestone design economic study computer program; alkali feedrate automatic control for limestone scrubbers; tests on the concurrent scrubber at TVA/Shawnee; and forced-oxidation tests at the Widow's Creek Unit 8 full-scale limestone scrubber. The conference provided developers, vendors, users, and those concerned with regulatory guidelines with a current review of progress made in IERL-RTP's FGD technology development program.

PB80-199821 PC **A05**/MF **A01**
Environmental Sciences Research Lab., Research Triangle Park, NC.
Air Pollution Concentrations Associated with Stagnation and Restricted Visibility, Eastern North America, August 1976,
Gerard A. DeMarrais. Jul 80, 82p EPA-600/4-80-038

August 16 to 22, 1976, was designated as a stagnation period for a large part of the eastern United States by the Korshover technique, and Lyons and his associates judged August 16 to 28 to be a stagnation period. The effect of the 13 days of stagnation on five pollutants (total suspended particulates, carbon monoxide, sulfur dioxide, ozone and sulfates) and the association of various pollutants with restricted visibility are discussed in detail. Because long-range transport contributes to high concentrations of pollutants, trajectory analyses are included to indicate the approximate source-receptor relationships.

PB80-199839 PC **A06**/MF **A01**
Environmental Monitoring Systems Lab., Las Vegas, NV.
Western Energy Resource Development: A Network for Monitoring the Impact on Surface Water Quality.
Final rept.,
Robert W. Thomas. Jul 80, 109p EPA-600/4-80-036

A monitoring network to assess the impact of energy resource development on surface water quality in Western Mountain States is developed. A literature review of energy resource development activities, known and potential pollutants, monitoring strategies, and data requirements for statistical analyses located the river systems most likely to be affected, determined parameters of interest, and identified deficiencies in existing monitoring operations.

PB80-812670 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Planning and Management of Water Resource Programs. June, 1977-May, 1980 (Citations from the NTIS Data Base).
Rept. for Jun 77-May 80,
Robena J. Brown. Jul 80, 308p
Supersedes NTIS/PS-79/0583 and NTIS/PS-78/0464. See also 1964-1974, NTIS/PS-77/0487 and 1975-May, 1977, NTIS/PS-78/0463.

The cited studies cover planning and management of water resource programs and projects at the local, regional, state and national level. Water quality, drinking water, irrigation water, and industrial water studies of specific localities are included, if they are applicable to other areas. The topics concern the impact and benefits of water resource development, water costs, water conservation, ground water management, decision making, and modeling. (This updated bibliography contains 170 citations, 130 of which are new entries to the previous edition.)

PB80-812753 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Railroad Management Planning. 1974-June, 1980 (A Bibliography with Abstracts).
Rept. for 1974-Jun 80,
Edith Kenton. Jul 80, 209p
Supersedes NTIS/PS-79/0738 and NTIS/PS-78/0594. See also 1964-1973, NTIS/PS-76/0170.

Studies are presented of railroad planning concerning operating costs, yard operations, intermodal systems, railway abandonment and consolidation, efficiency in operations and services, freight car utilization systems, forecasting future railroad freight and passenger market and the potential of energy conservation in railroad transportation. (This updated bibliography contains 202 abstracts, 46 of which are new entries to the previous edition.)

PB80-812779 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Urban Noise Pollution. 1970-June, 1980 (A Bibliography with Abstracts).
Rept. for 1970-Jun 80,
Edith Kenton. Jul 80, 229p
Supersedes NTIS/PS-79/0689 and NTIS/PS-78/0686.

Aspects of noise in the urban environment are covered. The topics were chosen for their interest to urban planners and include citizen attitudes, transportation noise, and noise abatement techniques. (This updated bibliography contains 220 abstracts, 31 of which are new entries to the previous edition.)

PB80-812787 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Highway Traffic Noise. 1964-June, 1980 (A Bibliography with Abstracts).
Rept. for 1964-Jun 80,
Edith Kenton. Jul 80, 245p
Supersedes NTIS/PS-79/0699.

The citations relate to many aspects of highway noise and its reduction. Studies include transportation noise models, environmental aspects, noise sources, tire-pavement studies, noise barrier design, noise levels, and research in the field. The bibliography also covers highway planning and Government policies in connection with noise pollution abatement and control strategies. Central city investigations are in general excluded. (This updated bibliography contains 238 abstracts, 18 of which are new entries to the previous edition.)

PB80-812795 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Multimodal Transportation Planning. 1972-June, 1980 (A Bibliography with Abstracts).
Rept. for 1972-Jun 80,
Edith Kenton. Jul 80, 109p
Supersedes NTIS/PS-79/0737 and NTIS/PS-78/0538.

The bibliography presents many aspects of transportation planning - passenger and freight - for urban areas and intercity corridors. Multimodal systems, planning and programming, transportation models, forecasting and management is covered. This includes work travel patterns, trip generation, urban transportation demand, modal choice, and travel forecasting models. Urban and intercity freight transportation as regards modal choice, planning and intermodal systems, including intermodal consolidation terminals is also included. (This updated bibliography contains 102 abstracts, 15 of which are new entries to the previous edition.)

PB80-812803 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Highway Ramp Control. 1964-June, 1980 (A Bibliography with Abstracts).
Rept. for 1964-Jun 80,
Edith Kenton. Jul 80, 149p
Supersedes NTIS/PS-79/0644 and NTIS/PS-78/0588.

The bibliography contains citations of reports on ramp design, merging control, ramp metering, and ramp use. Studies are documented of freeway collector lanes, exits into city streets, traffic bottlenecks, express bus lanes, vehicle collisions, road curves, freeway entry control--all involving ramp engineering. Computerized simulations and freeway corridor models are presented, along with traffic models, ramp control strategies, optimization procedures, and studies of freeway traffic flow. A few cases in which accident incidence has been linked to faulty ramp design, thereby calling for improved vehicle monitoring has been included. (This updated bibliography contains 142 abstracts, 12 of which are new entries to the previous edition.)

PB80-812829 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
New Towns and New Communities: Planning and Development. 1964-June, 1980 (A Bibliography with Abstracts).
Rept. for 1964-Jun 80,
Edith Kenton. Jul 80, 165p
Supersedes NTIS/PS-79/0643 and NTIS/PS-78/0589.

Developmental programs and projects are documented for planned urban areas in various sections of the U.S. Financing, benefits, problems, management, land use, services, environmental aspects, transportation, housing, esthetics, citizen affairs, industrial relations, employment, community interests, commerce, and public administration are among the topics concerned. Models are constructed, and reports are given on several specific localities and towns. A few environmental impact statements are included. (This updated bibliography contains 158 abstracts, 12 of which are new entries to the previous edition.)

PB80-812845 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Highway Traffic Detectors and Detection. 1964-June, 1980 (A Bibliography with Abstracts).
Rept. for 1964-Jun 80,
Edith Kenton. Jul 80, 167p
Supersedes NTIS/PS-79/0642 and NTIS/PS-78/0587.

Reports are cited on the development, calibration, testing, and operation of motor vehicle detectors and the detection of traffic incidents on highways and roads. Research is included on freeway surveillance, closed circuit television, electronic reconnaissance, magnetic measuring devices, traffic flow monitors, and sensor configurations. Investigations of snow and ice detection on bridges are noted. Other topics are radar sensors, automatic control equipment, communication, diamond interchange traffic, headway monitoring, critical intersections, overheight truck load detection, and the placement of detectors. (This updated bibliography contains 160 abstracts, 23 of which are new entries to the previous edition.)

SAND-80-0021C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Worst-Case Scenario Syndrome.
E. L. Wilmot, and R. E. Luna. 1980, 8p CONF-800334-10
Contract EY-76-C-04-0789
DOE environmental control symposium, Reston, VA, USA, 17 Mar 1980.

Worst-case scenario impacts which must be included in an environmental impact statement (EIS) are discussed. The author presents arguments against their inclusion in the EIS. The low-probability-high-risk scenarios are recalled by the public in far more cases than the realistically expected impacts. The techniques used in creating worst-case scenarios are discussed. An example is given from the EIS of the Waste Isolation Pilot Plant concerning a transportation accident. (ERA citation 05:020729)

13C. Construction Equipment Materials, and Supplies

AD-A085 598/1 PC **A03**/MF **A01**
Army Engineer Waterways Experiment Station Vicksburg MS
Development of Procedures for Nondestructive Testing of Concrete Structures. Report 2. Feasibility of Sonic Pulse-Echo Technique.
Miscellaneous paper,
A. Michel Alexander. Apr 80, 30p Rept no. WES-MP-C-77-11-2
See also AD-A046 113.

A sonic pulse-echo system has been developed that will measure the length of long, thin concrete members such as piles and detect discontinuities within the members. A longitudinal pulse is introduced into the concrete at a surface by mechanical impact, and the echo time is measured using the time base of an oscilloscope. The velocity of the longitudinal wave is determined initially on a known length of similar concrete. In situ pile lengths up to 70 ft have been measured successfully in soil with low damping characteristics. The system successfully measured the lengths of three drilled piers and detected the location of flaws in the piers incorporated by design at the University of Texas at Austin. Measurements of thin slabs were found to be more difficult than measurements of piles. Because reflections of echoes in thin sections are of much higher frequency, elastic pulses containing higher frequencies must be introduced into the concrete. Research should continue in an effort to provide a pulse-echo system that will be capable of nondestructive evaluation of all geometries of Civil Works structures. An ultrasonic unit of low frequency and high energy level should be de-

signed to improve resolution above that of a sonic system for thin sections.

PAT-APPL-6-009 624 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
High Temperature Concrete Composites Containing Organosiloxane Crosslinked Copolymers.
Patent Application,
A. Zeldin, N. Carciello, L. Kukacka, and J. Fontana. Filed 6 Feb 79, 18p
Contract EY-76-C-02-0016
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

High temperature polymer concrete composites comprising about 10 to 30% by weight of a liquid monomer mixture is described. It consists essentially of an organosiloxane polymer crosslinked with an olefinically unsaturated monomer selected from the group consisting of styrene, methyl methacrylate, trimethylolpropane trimethacrylate, triallyl cyanurate, n-phenylmalimide, divinyl benzene and mixtures thereof. About 70 to 90% by weight of an inert inorganic filler system containing silica sand and portland cement, Fe sub 2 O sub 3 , carbon black or mixtures thereof. Optionally a free radical initiator such as di-tert-butyl peroxide, azobisisobyutyronitrile, benzoyl peroxide, lauryl peroxide and other organic peroxides are used to initiate crosspolymerization of the monomer mixture in the presence of the inorganic filler. (ERA citation 05:024439)

PAT-APPL-6-025 503 PC **A03**/MF **A01**
Department of Energy, Washington, DC.
Polymer Concrete Composites for the Production of High Strength Pipe and Linings in High Temperature Corrosive Environments.
Patent Application,
A. Zeldin, N. Carciello, J. Fontana, and L. Kukacka. Filed 30 Mar 79, 28p
Contract EY-76-C-02-0016
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

High temperature corrosive resistant, non-aqueous polymer concrete composites are described. They comprise about 12 to 20% by weight of a water-insoluble polymer binder polymerized in situ from a liquid monomer mixture consisting essentially of about 40 to 70% by weight of styrene, about 25 to 45% by weight acrylonitrile and about 2.5 to 7.5% by weight acrylamide or methacrylamide and about 1 to 10% by weight of a crosslinking agent. This agent is selected from the group consisting of trimethylolpropane trimethacrylate and divinyl benzene; and about 80 to 88% by weight of an inert inorganic filler system containing silica sand and portland cement, and optionally Fe sub 2 O sub 3 or carbon black or mica. A free radical initiator such as di-tert-butyl peroxide, azobisisobutyronitrile, benzoyl peroxide, lauryl peroxide, other organic peroxides and combinations thereof to initiate crosspolymerization of the monomer mixture in the presence of said inorganic filler. (ERA citation 05:024444)

PAT-APPL-6-027 689 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
High Temperature Chemically Resistant Polymer Concrete.
Patent Application,
T. Sugama, and L. E. Kukacka. Filed 6 Apr 79, 25p
Contract EY-76-C-02-0016
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

High temperature chemically resistant, non-aqueous polymer concrete composites consist of about 12 to 20% by weight of a water-insoluble polymer binder. The binder is polymerized in situ from a liquid vinyl-type monomer or mixture of vinyl containing monomers such as triallylcyanurate, styrene, acrylonitrile, acrylamide, methacrylamide, methyl-methacrylate, trimethylolpropane trimethacrylate and divinyl benzene. About 5 to 40% by weight of a reactive inorganic filler selected from the group consisting of tricalcium silicate and dicalcium silicate and mixtures containing less than 2% free lime, and about 48 to 83% by weight of silica sand/ and a free radical initiator such as di-tert-butyl peroxide, azobisisobutyronitrile, benzoyl peroxide, lauryl peroxide, other orgaic peroxides and combinations to initiate polymerization of the monomer in the presence of the inorganic filers are used. (ERA citation 05:024443)

13D. Containers and Packaging

DOE/JPL/954878-5 PC **A04**/MF **A01**
Coors Porcelain Co., Golden, CO.
Development of Mullite Substrates and Containers. Final Report, October 7, 1977-April 15, 1979.
J. D. Sibold, and D. G. Wirth. 20 Apr 79, 54p
Contract NAS-7-100-954878

The objective of this program was to evaluate mullite in contact with molten silicon to be used as a substrate for Honeywell's Silicon-On-Ceramic process and as a container for melting solar grade silicon. A further requirement was to fabricate respective substrates and containers. To maintain solar grade silicon purity levels, the mullite must generally introduce less than 10 exp 15 atoms/cc of impurities. To evaluate the mullite-molten silicon interaction, a series of bodies were made with variations in density, alumina-silica ratio and glass-crystalline ratio. These materials were tested in a sessile drop technique. None of the variations stood up to extended exposure to molten silicon sufficiently to be recommended as a contaner material. However, directional solidification experiments by Jet Propulsion Laboratory suggest that, under proper conditions, contamination of the silicon by mullite containers can be minimized. To improve an already good thermal expansion match between mullite and silicon, compositional variations were studied. Altering of the alumina-silica ratio was determined to give a continuously varying thermal expansion. Thus, a composition can be selected to give the desired thermal expansion match with silicon. (ERA citation 05:021979)

UCRL-84280 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Holographic Nondestructive Evaluation of Spherical Kevlar/Epoxy Pressure Vessels.
D. M. Boyd, and B. W. Maxfield. 23 May 79, 16p
CONF-7905151-1
Contract W-7405-ENG-48
29. meeting of the Mechanical Failures Prevention Group, Gaithersburg, MD, USA, 23 May 1979.

Three spherical kevlar/epoxy pressure vessels were evaluated using holographic interferograms provide information on the failure modes, displacement profile, and possible fiber damage. The holograms show a symmetric anisotropic displacement pattern even though the vessels failed due to a leak in the aluminum mandrels. The presence of a biconvex fringe pattern found during the testing of vessel three is believed to indicate matrix crazing. This information would be useful for burst type failure analysis. Holographic interferometry has been shown to supply information on the characteristics of kevlar/epoxy pressure vessels under stress. (ERA citation 05:022779)

13E. Couplings, Fittings, Fasteners, and Joints

CONF-771140-6 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Residual Elements Have Significant Effects on the Elevated-Temperature Properties of Austenitic Stainless Steel Welds.
D. P. Edmonds, R. T. King, and G. M. Goodwin. 1977, 11p
Contract W-7405-ENG-26
ASTM symposium on the influence of carbon, nitrogen, and residual element chemistry on the behavior of austenitic stainless steels used in construction, Atlanta, GA, USA, 14 Nov 1977.

The influence of various residual elements on the elevated-temperature properties of austenitic stainless steel welds was investigated. Included in this investigation are the effects of B, P, Ti, C, S, and Si. This work is aimed at developing austenitic stainless steel weld materials with enhanced elevated-temperature properties. The materials investigated in this program include types 308, 316, 16-8-2 stainless steel weld metals. Processes investigated include shielded metal-arc (SMA), gas tungsten-arc (GTA), and submerged-arc (SA) welding. Early work was done with type 308 and 316 SMA weld metals where the greatest enhancement of properties resulted from controlled additions of boron, phosphorus, and titanium to the deposits. Significant improvements in the properties of GTA and SA welds also result from the addition of these residual elements. The optimum residual element compositions were determined to be nominally 0.05% Ti, 0.04% P, and 0.006% B for SMA welds and 0.5% Ti, 0.04% P, and 0.006 B for GTA welds. Submerged-arc welds with 0.2% Ti have exhibited improved creep strengths for all three materials. (ERA citation 05:020878)

COO-2462-6 PC **A02**/MF **A01**
Rensselaer Polytechnic Inst., Troy, NY. Dept. of Materials Engineering.
Localized Corrosion and Stress Corrosion Cracking Behavior of Austenitic Stainless Steel Weldments Containing Retained Ferrite. Annual Progress Report, June 1, 1979-March 31, 1980.
W. F. Savage, and D. J. Duquette. Mar 80, 9p
Contract AS02-76ER02462

Localized corrosion and stress corrosion cracking experiments were performed on single phase 304 stainless steel alloys and autogeneous weldments containing retained delta ferrite as a second phase. The results of the pitting experiments show that the presence of delta ferrite decreases localized corrosion resistance with pits initiating preferentially at delta ferrite-gamma austenite interphase boundaries. This increased susceptibility is reversible with elevated temperature heat treatments which revert the metastable ferrite phase to the equilibrium austenite phase. Experiments have also been conducted as functions of surface preparation, pH, Cl exp - concentration and temperatures from 20 exp 0 C to 290 exp 0 C. These experiments indicate that pitting tendency for both single phase and two phase alloys is controlled by the physical properties of the passive films which are naturally forced. The results of the SCC experiments have shown that, for two phase alloys at temperatures from 20 exp 0 C to 290 exp 0 C, the ferrite phase also significantly affects stress corrosion resistance. At low temperatures and low pH the ferrite phase is preferentially dissolved, while at intermediate temperatures and pH's the delta/gamma interface is the preferred crack path. At high temperatures cracking is associated with pitting, and depends sensitively on 0 sub 2 concentration of the environment. Additionally, the addition of SO sub 4 /sup =/ to chloride containing environments has a marked inhibitive effect on SCC. (ERA citation 05:020899)

PB80-808595 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Anchor Bolts. 1970-April, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1970-Apr 80,
Robert Hippler. May 80, 72p
Sponsored in part by National Technical Information Service, Springfield, VA.

Cited abstracts discuss anchor bolts, roof bolts or rock bolts as used mostly in mine and other underground operations. Bolt design and construction, hole drilling techniques, methods of bolt mounting, and measurements of installed bolt condition are described. Some citations treat non-mining rock bolt applications. (Contains 70 citations)

13F. Ground Transportation Equipment

AD-A085 736/7 PC **A02**/MF **A01**
Human Resources Research Organization Alexandria VA
Driver Evaluation of the GOER Vehicle, Conducted during the Feasibility Test.
Research memo.,
Arthur Floyd, Jr., Shepard Schwartz, and Howard C. Olson. Feb 80, 16p
Contract DA-49-106-qm-1

This memorandum discusses a project to evaluate a model cargo-carrier vehicle characterized by

large-diameter, low-pressure tires, positive-powered wagon steer, and exoskeleton construction. It describes in particular the selection, proficiency testing, and interviewing of student-driver trainees. Selection criteria are reviewed; results of proficiency tests and of interviews conducted during and after the training are reported. An appendix presents responses to both interview rounds. (Author)

DOE/CS-0107 PC **A04**/MF **A01**
Department of Energy, Washington, DC. Office of Transportation Programs.
Charge of the Future: An Introduction to Electric and Hybrid Vehicles.
Sep 79, 75p

The past history and present development of electric vehicles are described in four sections, covering the following topics: electric vehicles today; the Congressional focus on electric and hybrid vehicles; and new directions in electric and hybrid vehicles development. In the near term, electric vehicles are neither intended nor expected to compete directly with internal combustion engine vehicles. (ERA citation 05:020853)

LA-UR-80-816 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Fuel-Cell-Powered Golf Cart.
R. E. Bobbett, J. B. McCormick, D. K. Lynn, W. J. Kerwin, and C. R. Derouin. 1980, 25p CONF-800523-1
Contract W-7405-ENG-36
international electric vehicle exposition and conference, St. Louis, MO, USA, May 1980.

The implementation of a battery/fuel-cell-powered golf cart test bed designed to verify computer simulations and to gain operational experience with a fuel cell in a vehicular environment is described. A technically untrained driver can easily operate the golf cart because the motor and fuel cell controllers automatically sense and execute the appropriate on/off sequencing. A voltage imbalance circuit and a throttle compress circuit were developed that are directly applicable to electric vehicles in general. (ERA citation 05:020772)

N80-25661/3 PC **A08**/MF **A01**
AiResearch Mfg. Co., Torrance, CA.
Design Study of Toroidal Traction Cvt for Electric Vehicles.
Final Report.
A. E. Raynard, J. Kraus, and D. D. Bell. Jan 80, 161p NASA-CR-159803, DOE/NASA/0117-80/1
Contracts DEN3-117, EC-77-A-31-1044

The development, evaluation, and optimization of a preliminary design concept for a continuously variable transmission (CVT) to couple the high-speed output shaft of an energy storage flywheel to the drive train of an electric vehicle is discussed. An existing computer simulation program was modified and used to compare the performance of five CVT design configurations. Based on this analysis, a dual-cavity full-toroidal drive with regenerative gearing is selected for the CVT design configuration. Three areas are identified that will require some technological development: the ratio control system, the traction fluid properities, and evaluation of the traction contact performance. Finally, the suitability of the selected CVT design concept for alternate electric and hybrid vehicle applications and alternate vehicle sizes and maximum output torques is determined. In all cases the toroidal traction drive design concept is applicable to the vehicle system. The regenerative gearing could be eliminated in the electric powered vehicle because of the reduced ratio range requirements. In other cases the CVT with regenerative gearing would meet the design requirements after appropriate adjustments in size and reduction gearing ratio.

N80-26201/7 PC **A20**/MF **A01**
Minicars, Inc., Goleta, CA.
Near Hybrid Passenger Vehicle Development Program, Phase 1. Appendices a and B. Mission Analysis and Performance Specification Studies Report, Volume 1.
Oct 79, 468p NASA-CR-163330, JPL-9950-37
Contract NAS7-100
Revised. Sponsored in Part by DOE.

The three most promising vehicle use patterns (missions) for the near term electric hybrid vehicle were found to be all-purpose city driving, commuting, and family and civic business. The mission selection process was based principally on an analysis of the travel patterns found in the Nationwide Transportation Survey and on the Los Angeles and Washington, D.C. origin-destination studies data. Travel patterns in turn were converted to fuel requirements for 1985 conventional and hybrid cars. By this means, the potential fuel savings for each mission were estimated, and preliminary design requirements for hybrid vehicles were derived.

N80-26202/5 PC **A16**/MF **A01**
Minicars, Inc., Goleta, CA.
Near Hybrid Passenger Vehicle Development Program, Phase 1. Appendices C and D, Volume 2.
Final Report.
Oct 79, 352p NASA-CR-163331, JPL-9950-337
Contract NAS7-100
Sponsored in Part by DOE.

Results of tradeoff studies are presented in summary form. Various aspects of the overall vehicle design discussed include selection of the base vehicle, the battery pack configuration, structural modifications, occupant protection, vehicle dynamics, and aerodynamics. The drivetrain design and integration, power conditioning unit, battery subsystem, control system, environmental system are described. Specifications, weight breakdown, and energy consumption measures, and advanced technology components are included.

N80-26203/3 PC **A10**/MF **A01**
General Electric Co., Schenectady, NY.
Near-Term Hybrid Vehicle Program, Phase 1. Appendix B: Design Trade-off Studies.
Final Report.
8 Oct 79, 204p NASA-CR-163227, SRD-79-134/3-APP-B-V-1
Contract JPL-955190
Prepared for JPL.

The relative attractiveness of various hybrid/electric power train configurations and electrical and mechanical drive-line components was studied. The initial screening was concerned primarily with total vehicle weight and economic factors and identified the hybrid power train combinations which warranted detailed evaluation over various driving cycles. This was done using a second-by-second vehicle simulation program which permitted the calculations of fuel economy, electricity usage, and emissions as a function of distance traveled in urban and highway driving. Power train arrangement possibilities were examined in terms of their effect on vehicle handling, safety, serviceability, and passenger comfort. A dc electric drive system utilizing a separately excited motor with field control and battery switching was selected for the near term hybrid vehicle. Hybrid vehicle simulations showed that for the first 30 mi (the electric range of the vehicle) in urban driving, the fuel economy was 80 mpg using a gasoline engine and 100 mpg using a diesel engine. In urban driving the hybrid would save about 75% of the fuel used by the conventional vehicle and in combined urban/highway driving the fuel saving is about 50%.

N80-26204/1 PC **A14**/MF **A01**
General Electric Co., Schenectady, NY.
Near-Term Hybrid Vehicle Program, Phase 1. Appendix B: Design Trade-off Studies Report. Volume 2: Supplement to Design Trade-off Studies.
Final Report.
8 Oct 79, 319p NASA-CR-163228, SRD-79-134/4-APP-B-V-2
Contract JPL-955190
Prepared for JPL.

Results of studies leading to the preliminary design of a hybrid passenger vehicle which is projected to have the maximum potential for reducing petroleum consumption in the near term are presented. Heat engine/electric hybrid vehicle tradeoffs, assessment of battery power source, and weight and cost analysis of key components are among the topics covered. Performance of auxiliary equipment, such as power steering, power brakes, air conditioning, lighting and electrical accessories, heating and ventilation is discussed along with the selection of preferred passenger compartment heating procedure for the hybrid vehicle. Waste heat from the engine, thermal energy storage, and an auxiliary burner are among the approaches considered.

N80-26205/8 PC **A06**/MF **A01**
General Electric Co., Schenectady, NY.
Near-Term Hybrid Vehicle Program, Phase 1. Appendix B: Design Trade-off Studies Report. Volume 3: Computer Program Listings.
Final Report.
8 Oct 79, 115p NASA-CR-163229, SRD-79-134/5-APP-B-V-3
Contract JPL-955190
Prepared for JPL.

A description and listing is presented of two computer programs: Hybrid Vehicle Design Program (HYVELD) and Hybrid Vehicle Simulation Program (HYVEC). Both of the programs are modifications and extensions of similar programs developed as part of the Electric and Hybrid Vehicle System Research and Development Project.

N80-26206/6 PC **A07**/MF **A01**
General Electric Co., Schenectady, NY.
Near-Term Hybrid Vehicle Program, Phase 1.
Final Report.
8 Oct 79, 146p NASA-CR-163230, SRD-79-134/1
Contract JPL-955190
Prepared for JPL.

The preliminary design of a hybrid vehicle which fully meets or exceeds the requirements set forth in the Near Term Hybrid Vehicle Program is documented. Topics addressed include the general layout and styling, the power train specifications with discussion of each major component, vehicle weight and weight breakdown, vehicle performance, measures of energy consumption, and initial cost and ownership cost. Alternative design options considered and their relationship to the design adopted, computer simulation used, and maintenance and reliability considerations are also discussed.

N80-26207/4 PC **A07**/MF **A01**
General Electric Co., Schenectady, NY.
Near-Term Hybrid Vehicle Program, Phase 1. Appendix a: Mission Analysis and Performance Specification Studies Report.
Final Report.
8 Oct 79, 136p NASA-CR-163231, SRD-79-134/2-APP-A
Contract JPL-955190
Prepared for JPL. Original Contains Color Illustrations.

Results of a study leading to the preliminary design of a five passenger hybrid vehicle utilizing two energy sources (electricity and gasoline/diesel fuel) to minimize petroleum usage on a fleet basis are presented. The study methodology is described. Vehicle characterizations, the mission description, characterization, and impact on potential sales, and the rationale for the selection of the reference internal combustion engine vehicle are presented. Conclusions and recommendations of the mission analysis and performance specification report are included.

N80-26208/2 PC **A10**/MF **A01**
General Electric Co., Schenectady, NY.
Near-Term Hybrid Vehicle Program, Phase 1. Appendix C: Preliminary Design Data Package.
Final Report.
8 Oct 79, 206p NASA-CR-163232, SRD-79-134/6-APP-C
Contract JPL-955190
Prepared for JPL.

The design methodology, the design decision rationale, the vehicle preliminary design summary, and the advanced technology developments are presented. The detailed vehicle design, the vehicle ride and handling and front structural crashworthiness analysis, the microcomputer control of the propulsion system, the design study of the battery switching circuit, the field chopper, and the battery charger, and the recent program refinements and computer results are presented.

N80-26209/0 PC **A04**/MF **A01**
General Electric Co., Schenectady, NY.

Near-Term Hybrid Vehicle Program, Phase 1. Appendix D: Sensitivity Analysis Resport.
Final Report.
8 Oct 79, 55p NASA-CR-163233, SRD-79-134/7-APP-D
Contract JPL-955190
Prepared for JPL.

Parametric analyses, using a hybrid vehicle synthesis and economics program (HYVELD) are described investigating the sensitivity of hybrid vehicle cost, fuel usage, utility, and marketability to changes in travel statistics, energy costs, vehicle lifetime and maintenance, owner use patterns, internal combustion engine (ICE) reference vehicle fuel economy, and drive-line component costs and type. The lowest initial cost of the hybrid vehicle would be $1200 to $1500 higher than that of the conventional vehicle. For nominal energy costs ($1.00/gal for gasoline and 4.2 cents/kWh for electricity), the ownership cost of the hybrid vehicle is projected to be 0.5 to 1.0 cents/mi less than the conventional ICE vehicle. To attain this ownership cost differential, the lifetime of the hybrid vehicle must be extended to 12 years and its maintenance cost reduced by 25 percent compared with the conventional vehicle. The ownership cost advantage of the hybrid vehicle increases rapidly as the price of fuel increases from $1 to $2/gal.

N80-26210/8 PC **A07**/MF **A01**
Minicars, Inc., Goleta, CA.
Near Term Hybrid Passenger Vehicle Development Program, Phase 1.
Final Report.
Jan 80, 144p NASA-CR-163235, JPL-9950-337
Contracts NAS7-100, JPL-955188
Sponsored in Part by DOE Prepared for JPL.

Missions for hybrid vehicles that promise to yield high petroleum impact were identified and a preliminary design, was developed that satisfies the mission requirements and performance specifications. Technologies that are critical to successful vehicle design, development and fabrication were determined. Trade-off studies to maximize fuel savings were used to develop initial design specifications of the near term hybrid vehicle. Various designs were 'driven' through detailed computer simulations which calculate the petroleum consumption in standard driving cycles, the petroleum and electricity consumptions over the specified missions, and the vehicle's life cycle costs over a 10 year vehicle lifetime. Particular attention was given to the selection of the electric motor, heat engine, drivetrain, battery pack and control system. The preliminary design reflects a modified current compact car powered by a currently available turbocharged diesel engine and a 24 kW (peak) compound dc electric motor.

N80-26212/4 PC **A10**/MF **A01**
AiResearch Mfg. Co., Torrance, CA.
Advanced Propulsion System for Hybrid Vehicles.
Final Report.
L. V. Norrup, and A. T. Lintz. Jan 80, 213p
NASA-CR-159771, DOE/NASA/0091-80/1
Contracts DEN3-91, EC-77-A-31-1044

A number of hybrid propulsion systems were evaluated for application in several different vehicle sizes. A conceptual design was prepared for the most promising configuration. Various system configurations were parametrically evaluated and compared, design tradeoffs performed, and a conceptual design produced. Fifteen vehicle/propulsion systems concepts were parametrically evaluated to select two systems and one vehicle for detailed design tradeoff studies. A single hybrid propulsion system concept and vehicle (five passenger family sedan)were selected for optimization based on the results of the tradeoff studies. The final propulsion system consists of a 65 kW spark-ignition heat engine, a mechanical continuously variable traction transmission, a 20 kW permanent magnet axial-gap traction motor, a variable frequency inverter, a 386 kg lead-acid improved state-of-the-art battery, and a transaxle. The system was configured with a parallel power path between the heat engine and battery. It has two automatic operational modes: electric mode and heat engine mode. Power is always shared between the heat engine and battery during acceleration periods. In both modes, regenerative braking energy is absorbed by the battery.

PAT-APPL-6-158 907 PC **A02**/MF **A01**
Department of Transportation, Washington, DC.
Hand-Held Railraod Data Acquisition System.
Patent Application,
Lennart E. Long, and Edward A. Sarkisian. Filed 12 Jun 80, 14p PB80-196900, DOT/CASE/TSC-10147
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The invention is a data acquisition system including a condition responsive sensor for producing an analog signal indicative of a given variable condition, a delta modulator circuit connected to receive and convert the analog signal into a modulated pulse train indicative of the given condition, an encoder circuit connected to receive and convert the modulated pulse train into an audio output signal, and a recorder connected to receive and record the audio output signal. The encoder produces Harvard phase coding of the modulated pulse train and produces an audio output signal in a range between 1000 and 3000 Bauds that is compatible with cassette tape recorders.

PATENT-4 205 553 Not available NTIS
Department of Transportation, Washington, DC.
Automated Gain Control in Rail Flaw Detection.
Patent,
Robert P. Rudis, and Harry L. Ceccon. Filed 21 Feb 79, patented 3 Jun 80, 10p PB80-198146, PAT-APPL-6-013 514
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

The patent describes automated gain control in rail flaw detection which includes attenuation of echoes from rails pulsed with a burst of sonic energy, comparing said attenuated signals over discrete intervals, and reducing or increasing said attenuation in response thereto to develop a uniform signal from which an evaluation of flaw indicating echoes can be obtained.

PB80-193758 PC **A06**/MF **A01**
Naval Surface Weapons Center, Silver Spring, MD.
Railroad Car Roller Bearing Temperature Measurement and Analysis.
Technical progress rept.,
Thomas V. Peacock, and Hugh H. Snider, Jr. Apr 80, 105p TN 78-28, FRA/ORD-80/43

This report describes a series of field measurements of the operating temperatures of railcar roller bearings. These measurements included operating temperatures at train speeds of 30 mph and 50 mph with loaded and unloaded cars. Also included are measurements taken when all the lubrication was removed from the bearing and the bearing was allowed to fail due to overheating. These measurements were taken in support of the Department of Transportation System for Train Accident Reduction (DOT-STAR) Program. DOT-STAR was designed by the Naval Surface Weapons Center to detect overheated bearings and minor derailments and to stop the train. Various overheated bearing (thermal) sensor locations were evaluated. A 300F bearing surface temperature was established as the temperature at which to stop the train. A computer model was developed to predict railroad car roller bearing temperatures. This model was adjusted to agree with measured data. The model was used to predict bearing temperature at a train speed of 80 mph in an ambient temperature of 125F. This prediction was discussed with roller bearing experts and was thought to be too high. Adjustments were made to the computer model.

PB80-194160 PC **A04**/MF **A01**
Center for the Environment and Man, Inc., Hartford, CT.
Design of Field Passive Restraint Evaluation.
Final rept. Sep 78-Feb 79,
Hans C. Joksch. Mar 80, 75p CEM-4250-694, DOT-HS-805 361
Contract DOT-HS-8-02109

Federal Motor Vehicle Safety Standard 208 will require passive restraints on certain classes of automobiles beginning with the model year 1982. Currently, certain automobile models are equipped with passive restraints. Others are expected to voluntarily offer passive restraints prior to 1982. Alternative approaches to collecting accident data on passive restraint cars during the period up to 1981 were studied. The number of accidents to be expected was estimated, as were the numbers which could be studied using the different approaches. The error of effectiveness estimates obtainable from the different approaches were estimated.

PB80-194178 PC **A03**/MF **A01**
Michigan Univ., Ann Arbor. Highway Safety Research Inst.
Evaluations of Experimental (Including High-Mounted) Configurations of Brake Lights in Actual Traffic.
Final rept. Mar-Aug 79,
Michael Sivak, David V. Post, and Paul L. Olson. Nov 79, 41p UM-HSRI-79-87
Sponsored in part by General Motors Corp., Warren, MI. Technical Center.

The efficiency of various configurations of brake lights in actual traffic was tested in two daytime experiments. The first experiment investigated the reaction times of informed drivers to 22 configurations of brake signals drawn from a 3 x 3 array of rear lamps. The main finding of this experiment is that adding supplemental (including high-mounted) lamps to the conventional two-lamp configuration did not shorten the reaction times. Other findings indicate that the lateral position of the lamps, the following distance, as well as the sex and age of the driver had significant effects on reaction times, while the mounting height of the lamps did not. The second experiment evaluated brake responses of unsuspecting drivers to brake-signal presentations using a conventional brake-lamp system with and without supplemental high-mounted brake lamp(s). The signals were presented at speeds of 30-45 mph. The main finding of this experiment is that the signals given by the systems with one or two supplemental high-mounted brake lamps were more likely to produce a brake response by a following driver. On the other hand, the reaction times of the brake responses did not vary between the systems.

PB80-194244 PC **A07**/MF **A01**
Rouse (W. V.) Associates Ltd., Evanston, IL.
Predicting Automated Guideway Transit System Station Security Requirements.
Final rept. Oct 77-Jan 80,
C. Ray, D. Stuart, D. Thomson, V. Rouse, and J. Botts. Mar 80, 148p DOT-TSC-UMTA-80-5, UMTA-MA-06-0048-80-4
Contract DOT-TSC-1454

This study addresses the issues of personal security on Automated Guideway Transit (AGT) Systems, as they might be deployed in typical urban residential and non-residential settings. Based upon a literature review, it outlines basic characteristics of existing transit crime; compares station design concepts for AGT and conventional rail transit; reviews the key environmental characteristics of AGT stations which may influence crime potential; inventories both existing and proposed countermeasures for transit crime reduction; identifies additional neighborhood resources which might be mobilized as countermeasures; reviews available techniques for predicting transit crime; and reviews techniques available for both predicting transit crime and assessing countermeasure effectiveness and offers recommendations for analysis strategies to be employed in local AGT studies. Traditional as well as innovative analysis techniques are covered. This report recommends a general approach for AGT station security requirements analysis which can be used by localities in site-specific AGT planning and engineering studies. This report provides a list of references as well as an annotated bibliography.

PB80-194897 PC **A05**/MF **A01**
United States Steel Corp., Monroeville, PA. Research Lab.
Dynamic Behavior and Residual Stresses in Railroad Wheels.
Final rept.,
G. F. Carpenter, J. M. Wandrisco, and D. E. Sonon. Apr 80, 85p FRA/ORD-78/54
Sponsored in part by OAO Corp., Beltsville, MD.

A study of the dynamic behavior and residual stresses in straight-plate and curved-plate 33-inch-

diameter one-wear freight-car wheels has been conducted. The dynamic behavior was determined on instrumented wheels by simulating various loading and braking conditions on a dynamometer; residual stresses were determined by relaxation techniques. The data developed in this study, in conjunction with additional data to be developed in the overall program, can be used to verify finite-element computer programs and to conduct detailed analyses of the resistance of various wheels to fatigue failure. Also, the results of a preliminary assessment of the fatigue resistance of the wheels studied indicated that both wheels have adequate resistance to plate fatigue failures under 26.4-kip vertical-journal and 15-kip lateral loads and 60-mph emergency-braking conditions.

PB80-195696 PC **A04**/MF **A01**
Kinton, Inc., Alexandria, VA.
Owner Manuals for Service and Repair of FMVSS 121 Air Brake Systems.
Final rept. Sep 78-Nov 79,
Stanley E. Legum, Susanna Eden, Lola Zook, and Lawrence L. Ames. Nov 79, 62p DOT-HS-805 359
Contract DOT-HS-8-02038

The FMVSS 121 air brake anti-lock equipment is currently found on a half million vehicles operating on the nation's highways. Approximately half of these vehicles are maintained by owner-operators who usually act as their own mechanics. Many of these owner-operators are unfamiliar with the 121 maintenance and repair procedures. Consequently the anti-lock systems may be inoperative on their vehicles during long periods of time. The objectives of this project is to develop troubleshooting manuals that make the troubleshooting so simple that owner-operators can repair their own FMVSS 121 system and thereby change the attitude that causes systems to be inoperative for long periods.

PB80-195761 PC **A05**/MF **A01**
Vought Corp., Dallas, TX.
Evacuation and Rescue in Automated Guideway Transit. Volume I: Data Collection, Scenarios, and Evaluation.
Final rept. Jul 77-May 79,
David E. Benjamin. Dec 79, 84p DOT-TSC-UMTA-79-47-I, UMTA-MA-06-0048-79-2
Contract DOT-TSC-1314
See also Volume 2, PB80-195779.

The objective of one segment of this program, the Systems Safety and Passenger Security (SS&PS) Study, is the development of guidelines for the assurance of actual and perceived passenger safety and security in AGT systems. The evacuation and rescue task of the project has as its objective the production of a guidebook detailing the most effective methods and procedures for providing evacuation and rescue in AGT systems. In conventional transportation systems, transportation personnel can help to evacuate and rescue passengers. AGT systems, however, because of their unmanned nature and unique configurations, present a number of problems related to evacuation and rescue. Operation of AGT systems with elevated guideways also present significant problems. Serious injuries and loss of life can result from situations in which inadequate means of evacuating and rescuing passengers exist. The purpose of this portion of the SS&PS program was to identify these problems and where possible, recommend solutions. This document is Volume I of the final report on evacuation and rescue in AGT, and describes the methodology used in developing evacuation and rescue guidelines.

PB80-195779 PC **A05**/MF **A01**
Vought Corp., Dallas, TX.
Evacuation and Rescue in Automated Guideway Transit. Volume II: Guidebook.
Final rept. Apr 78-May 79,
David E. Benjamin. Dec 79, 97p DOT-TSC-UMTA-79-47-II, UMTA-MA-06-0048-79-3
Contract DOT-TSC-1314
See also Volume 1, PB80-195761.

The objective of one segment of the AGTT program, the Systems Safety and Passenger Security (SS&PS) Study, is the development of guidelines for the assurance of actual and perceived passenger safety and security in AGT systems. The evacuation and rescue task of the project has as its objective the production of a guidebook detailing the most effective methods and procedures for providing evacuation and rescue in AGT systems. In conventional transportation systems, transportation personnel can help to evacuate and rescue passengers. AGT systems, however, because of their unmanned nature and unique configurations, present a number of problems related to evacuation and rescue. Operation of AGT systems with elevated guideways also present significant problems. Serious injuries and loss of life can result from situations in which inadequate means of evacuating and rescuing passengers exist. The purpose of this portion of the SS&PS program was to identify these problems and where possible, recommend solutions. This Guidebook is Volume II of the final report on evacuation and rescue in AGT and provides guidelines and other information relative to evacuation and rescue of passengers from AGT systems. The report addresses a description of the problems and solutions as they exist on conventional and AGT systems, a discussion of the types of planning that are required to produce satisfactory evacuation and rescue solutions, and recommendations of suitable methods and procedures for AGT evacuation and rescue.

PB80-198856 PC **A11**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
Operation of Automated Guideway Transit Vehicles in Dynamically Reconfigured Trains and Platoons. Volume II. Part III. Systems Operations Analysis.
Final rept. Sep 76-Jul 79,
S. Shladover. Oct 79, 236p UMTA-MA-06-0085-79-3
See also report dated Jul 79, PB80-142862.

This study shows that the passenger capacity of AGT systems may be significantly increased by operating vehicles in dynamically reconfigured trains or platoons. It is estimated that a minimum lane capacity of 5,000 to 10,000 passengers per hour is needed to make single-party AGT economically competitive with buses and that this capacity requires the use of trains. Trains also offer several non-capacity-related operational advantages. The longitudinal control systems needed to effect dynamic en/extrainment with platoon operations at spacings of 30-60 cm are developed with particular attention to stability, jerk limiting requirements, safety and passenger comfort. The capacity advantage of entraining is demonstrated for a single guideway link and for merge junctions, using Monte Carlo simulation. Variable-slot-length point-follower control is shown to reduce merge delays and maneuver ramp lengths compared with fixed-slot-length methods. The 'zero gap' merge scheme developed here produces dramatic improvements compared with conventional merge strategies. The concepts of dynamic entrainment and platooning are shown to deserve more detailed study and testing because of the significant advantages they offer.

PB80-812761 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Motorcycle Safety, Environmental Effects, and Performance Studies. 1964-June, 1980 (A Bibliography with Abstracts).
Rept. for 1964-Jun 80,
Edith Kenton. Jul 80, 179p
Supersedes NTIS/PS-79/0641 and NTIS/PS-78/0364.

The reports cited in this bibliography primarily are concerned with motorcycle safety and pollution. These studies cover safety equipment and education, visual and visibility factors, noise, fuel consumption, engine performance, air pollution, vehicle design, tire and brake characteristics, and illuminating systems. Testing programs are described for both machines and operators, underlining impact and anthropomorphic crash data. Training programs are noted for drivers. Particular attention is given to accident prevention, safety helmets, and protective clothing. (This updated bibliography contains 172 abstracts, 37 of which are new entries to the previous edition.)

13G. Hydraulic and Pneumatic Equipment

PATENT-4 202 517 Not available NTIS
Department of the Navy Washington DC
Fluidic Interface Means.
Patent,
Robert W. Young, and Leonard D. Dansbury.
Filed 20 Jul 77, patented 13 May 80, 5p AD-D007 259/5, PAT-APPL-817 884
Supersedes PAT-APPL-817 884-77, AD-D004 507.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A means for interfacing between low pressure, low flow fluidic circuits and the high pressure, high flow input requirements of fluidic digital thrusters to control the roll, pitch or yaw rate of missiles is provided. Input pressures from the fluidic circuitry cause a fluidic digital amplifier to go to one of its two stable states. The output from the digital amplifier operates one piston in the interface means, causing it to close off a digital thruster control port. The same output is ported to the opposite side of the other interface means piston, causing it to unblock the other digital thruster control port. Blocking of the first control port causes the digital thruster to switch to either a left or right output leg to initiate a corrective thrust. The pistons are interlocked so that only one piston can be extended to cover a given control port at any time. (Author)

PATENT-4 203 458 Not available NTIS
Department of the Air Force Washington DC
Negative Gravity Swivel Device.
Patent,
Alfred J. Barrett, and Samuel M. Warner. Filed 5 Sep 78, patented 20 May 80, 5p AD-D007 277/7, PAT-APPL-939 753
Supersedes PAT-APPL-939 753-78.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An apparatus for withdrawing fluid from the fuel tank of an aircraft or missile. A structure of coaxial cylinders with one slidable member responding to transient variations in the direction of the gravitation ('g') force acting on the reservoir by reversing the fluid withdrawal location. When the 'g' force is positive, the fluid is drawn from the reservoir below. If the 'g' force becomes negative, the slidable cylinder translates to align a different set of passage ports within the structure, changing the location of the fluid draw to one within the fluid. (Author)

13H. Industrial Processes

K/CSD/INF-80/9 PC **A02**/MF **A01**
Union Carbide Corp., Oak Ridge, TN. Computer Sciences Div.
Requirements for Tolerances in a CAM-I Generalized, Solid Geometric Modeling System.
R. J. Easterday. 1980, 14p
Contract W-7405-ENG-26

For a geometric modeling system to support computer-assisted manufacturing, it is necessary that dimensioning and tolerancing information be available in computer-readable form. The requirements of a tolerancing scheme within a geometric modeling system are discussed; they include structure sufficient to characterize the tolerance specifications currently in use by industry, means to associate tolerance structures to the boundary representation, means to create and edit information in the tolerance structures, means to extract information from the data base, and functions to check for completeness and validity of the tolerances. 1 figure, 8 tables. (ERA citation 05:022773)

PAT-APPL-6-002 140 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
High-Temperature, High-Pressure Bonding of Nested Tubular Metallic Components.
Patent Application,
T. C. Quinby. Filed 9 Jan 79, 9p
Contract W-7405-ENG-26

This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A tool is described for effecting high-temperature, high-compression bonding between the confronting faces of nested, tubular, metallic components. In a typical application, the tool is used to produce tubular target assemblies for irradiation in nuclear reactors or particle accelerators. The target assembly comprising a uranum foil and an aluninum-alloy substrate. The tool is composed of graphite. It comprises a tubular restraining member in which a mechanically expandable tubular core is mounted to form an annulus. The components to be bonded are mounted in nested relation in the annulus. The expandable core is formed of individually movable, axially elongated segments whose outer faces cooperatively define a cylindrical pressing surface and whose inner faces cooperatively define two opposed, inwardly tapered, axial bores. Tapered rams extend into the bores. The loaded tool is mounted in a conventional hot-press provided with evacuation means, heaters for maintaining its interior at bonding temperature, and hydraulic cylinders for maintaining a selected inwardly directed pressure on the tapered rams. With the hot-press evacuated and the loaded tool at the desired temperature, the cylinders are actuated to apply the selected pressure to the rams. The rams in turn expand the segmented core to maintain the nested components in compression against the restraining member. These conditions are maintained until the confronting faces of the nested components are joined in a continuous, uniform bond characterized by high thermal conductivity. (ERA citation 05:024568)

PAT-APPL-6-022 897 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Pre-Treatment for Molybdenum or Molybdenum-Rich Alloy Articles to Be Plated.
Patent Application,
R. R. Wright. Filed 22 Mar 79, 8p
Contract W-7405-ENG-26
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method is described for etching a molybdenum or molybdenum-rich alloy surface to promote the formation of an adherent bond with a subsequently deposited metallic plating. In a typical application, the method is used as a pre-treatment for surfaces to be electrolessly plated with nickel. The pretreatment comprises exposing the crystal boundaries of the surface by anodizing the surface in acidic solution to form a continuous film of gray molybdenum oxide and removing the film. (ERA citation 05:024366)

PAT-APPL-6-033 088 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Process for Treating Weldments.
Patent Application,
R. K. Malik. Filed 25 Apr 79, 17p
Contract EY-76-C-07-1570
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The tensile ducttility and impact strength of weldments of nickel-based and stainless steel alloys are improved to that of the unaffected base metal by subjecting the weldments to an elevated temperature at an isostatic pressure for a period of time sufficient to render the material in the weld more homogeneous. (ERA citation 05:024365)

PATENT-4 163 637
Not available NTIS
Department of Energy, Washington, DC.
Method and Apparatus for Producing Small Hollow Spheres.
Patent,
C. D. Hendricks. Filed 29 Sep 78, patented 7 Aug 79, 8p PAT-APPL-947 665
Supersedes PAT-APPL-947 665-78.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A method and apparatus are described for producing small hollow spheres of glass, metal or plastic, wherein the sphere material is mixed with or contains as part of the composition a blowing agent which decomposes at high temperature (T greater than or equal to 600 exp 0 C). As the temperature is quickly raised, the blowing agent decomposes and the resulting gas expands from within, thus forming a hollow sphere of controllable thickness. The thus produced hollow spheres (20 to 10 exp 3 mu m) have a variety of application, and are particularly useful in the fabrication of targets for laser implosion such as neutron sources, laser fusion physics studies, and laser initiated fusion power plants. (ERA citation 05:023763)

PATENT-4 201 654
Not available NTIS
Department of the Air Force Washington DC
Anode Assisted Sputter Etch and Deposition Apparatus.
Patent,
B. Wayne Castleman. Filed 6 Oct 78, patented 6 May 80, 7p AD-D007 283/5, PAT-APPL-949 167
Supersedes PAT-APPL-949 167-78, AD-D005 579.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An anode assisted sputter etch and deposition apparatus having an electron source, a first anode adjacent the electron source and a second anode adjacent a negatively charged particle to be sputter etched or sputter target in an ionizable gas atmosphere. Upon production of the electrons from said electron source a plasma is formed between the electron source, the first anode and the second anode, the plasma adjacent the second anode being capable of desorbing gases and other absorbed vapors from the surface of the article or target while positive ions from the plasma bombard the article or target with sufficient energy to eject material from the surface thereof. (Author)

PB80-809007 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Gold Plating Processes. 1973-April, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1973-Apr 80,
C. Gilbert Young. Jun 80, 173p
Sponsored in part by National Technical Information Service, Springfield, VA.

Cited abstracts cover processes for producing a gold plating, such as sputtering, electroless deposition, and electrodeposition. Applications in electronics, aerospace, spectacle frames and jewelry, architectural glass, electrical equipment, scientific work, and other areas, are listed. Ways to reduce the use of gold, or alternatives to its use, are discussed. (Contains 195 citations)

PB80-809163 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Metal Sputtering. 1976-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1976-Apr 80,
Robert Hippler. May 80, 225p
Sponsored in part by National Technical Information Service, Springfield, VA.

Cited abstracts cover the subjects of metal sputtering and ion plating on metal, plastic, and vitreous substrates. The science of sputtering and ion plating, materials considerations, and practical applications are included. (Contains 200 citations)

PB80-809171 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Metal Sputtering. 1976-April, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1976-Apr 80,
Robert Hippler. May 80, 206p
Sponsored in part by National Technical Information Service, Springfield, VA.

Cited abstracts cover the subjects of metal sputtering and ion plating on metal, plastic, and vitreous substrates. The science of sputtering and ion plating, materials considerations, and practical applications are included. (Contains 200 citations)

PB80-809189 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Metal Sputtering. 1976-April, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for 1976-Apr 80,
Robert Hippler. May 80, 144p
Sponsored in part by National Technical Information Service, Springfield, VA.

Cited abstracts cover the subjects of metal sputtering and ion plating on metal, plastic and vitreous substrates. The science of sputtering and ion plating, materials considerations and practical applications are included. (Contains 132 citations)

13I. Machinery and Tools

AD-A085 406/7 Not available NTIS
Massachusetts Inst of Tech Cambridge
Fundamentals of Tribology,
Nam P. Suh, and Nannaji Saka. Jun 78, 1229p
Proceedings of the International Conference on the Fundamentals of Tribology, Cambridge, MA 1978.
Availability: MIT Press, Cambridge, MA HC $50.00 (No copies furnished by DTIC).

Tribology -- the science of friction, wear and lubrication -- is a burgeoning field rich in opportunities and at the same time in need of critical assessment. Notwithstanding the enormous strides made during the past three decades, tribology is still one of the least developed scientific fields both because of the limited attention it has received and because of its complex and interdisciplinary nature. The field abounds with conflicting theories. There are only a few theoretical models that can be used as the basis for design of materials, and surfaces in relative motion. The International Conference on Fundamentals of Tribology was organized to review the state of knowledge and to explore the exciting and important areas of research. To achieve these goals, leading scientists and engineers were invited to present definitive review papers and results of their recent research covering all aspects of tribology. They together with the other attendees of the conference made important contributions toward a better understanding of the subject through discussions. In compiling these proceedings the papers were carefully read and edited for accuracy, continuity and readability. The discussions were transcribed from the recordings made at the time of the conference and then edited. An effort was made to convey the spirit as well as the content of the discussions. Our editorial task has been made bearable, and even enjoyable, by the thought-provoking ideas expressed by the discussors. It is strongly recommended that the discussions be read in addition to the reviews and contributed papers to gain a proper perspective on the subject matter.

AD-A085 417/4 PC **A02**/MF **A01**
Rensselaer Polytechnic Inst Troy NY Dept of Mathematical Sciences
Lubrication Flow of a Particle-Fluid Mixture,
Donald A. Drew. Aug 78, 4p
Contract N00014-76-C-0187
Pub. in Jnl. of Applied Mechanics, v46 n1 p211-213 Mar 79.

No abstract available.

AD-A085 740/9 PC **A09**/MF **A01**
Mechanical Technology Inc Latham NY
The Development of an Automated Roller Inspection System Using Noncontacting Sensors.
Final rept. Nov 77-Feb 79,
Martin W. Eusepi. Nov 79, 189p MTI-79TR60, AFAL-TR-79-2076
Contract F33615-77-C-3142

An automated computer oriented inspection for measuring the dimensional characteristics of high DN bearing rollers has been designed. The system is based on the use of non-contacting miniature capacitance probes having a sensitivity of 1000 volts/in. and a line scan camera employing photo diodes combined with an enlarging lens system to provide a 40 x 10 to the -6 in./count sensitivity. The automated inspection system design is based on

the results of a laboratory investigation of gaging techniques and the performance evaluation of non automated breadboard versions of the system. (Author)

DOE/JPL/954901-79/6 PC **A04**/MF **A01**
RCA Labs., Princeton, NJ.
Development and Evaluation of die Materials for Use in the Growth of Silicon Ribbons by the Inverted Ribbon Growth Process. Task II. LSA Project. Final Report, October 1, 1977-March 31, 1979.
M. T. Duffy, S. Berkman, G. W. Cullen, R. V. D'Aiello, and H. I. Moss. Dec 79, 65p
Contract NAS-7-100-954901

Amorphous CVD layers of silicon nitride and silicon oxynitride are prepared by chemical vapor deposition (CVD). The CVD layers are converted to alpha - and beta -Si sub 3 N sub 4 in contact with molten silicon. Silicon nitride layers are converted initially to alpha -Si sub 3 N sub 4 with a low beta -Si sub 3 N sub 4 content. The alpha phase is then slowly converted to the beta phase accompanied by simultaneous decomposition. By contrast, silicon oxynitride (SiO/sub x/N/sub y/) layers are converted predominantly to beta -Si sub 3 N sub 4 with a low alpha -Si sub 3 N sub 4 content. In this process, oxygen is evolved, and there is no evidence for the existence of an oxynitride phase in the resulting layers. The analysis also indicates that beta -Si sub 3 N sub 4 is much more resistant to chemical attack by molten silicon than alpha -Si sub 3 N sub 4 . Consequently, CVD silicon oxynitride provides a useful means of obtaining relatively pure and inert beta -Si sub 3 N sub 4 as a substrate coating for prolonged exposure to molten silicon, while CVD silicon nitride coatings are useful for shorter exposure times. Crystallographic analysis of silicon ribbon test specimens, grown from CVD-coated vitreous carbon dies, indicates that silicon carbide inclusions are not present in the ribbon samples. The results of infrared analysis also show that the carbon content of the silicon ribbons is below detection level and lower than in the Czochralski seed material. (ERA citation 05:021983)

N80-25483/2 PC **A03**/MF **A01**
Council for Scientific and Industrial Research, Pretoria (South Africa).
The Testing and Application of Machinability Criteria.
I. Yellowley, and G. Barrow. 1979, 29p CSIR-TRANS-1457
Transl. Into English from Fertigung (Switzerland), No. 1, 1971 p 21-29.

The criteria for tool breakdown is discussed with respect to the quality of the workpiece. The influence of the cutting speed, feed, and cutting depth on the tool life is considered. Various methods are used for the determination of tool life.

PATENT-4 196 895 Not available NTIS
Department of the Navy Washington DC
Ring-Loaded Flexural Disc Spring.
Patent,
Timothy D. Sullivan. Filed 21 Jul 78, patented 8 Apr 80, 5p AD-D007 262/9, PAT-APPL-926 781
Supersedes PAT-APPL-926 781-78, AD-D005 375.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A ring-loaded flexural disc spring acts as an isolation mount in a thin cylindrical space in the tail of a longitudinal vibrator type of underwater sound transducer. The ring-loaded spring comprises a thin disc having a raised bearing surface at a specified distance from the perimeter on one side of the disc and a raised bearing surface at the perimeter on the other side of the disc. The spring flexes into a concave shape when a load is applied. The operation of the disc is linear over the entire specified load range. (Author)

PB80-809148 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Magnetic Bearings. 1974-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1974-Apr 80,
C. Gilbert Young. May 80, 22p
Sponsored in part by National Technical Information Service, Springfield, VA.

The design and applications of magnetic bearings are treated in this brief retrospective survey from a relatively new field. Magnetic levitation is covered in another bibliography. Quantitative discussions of the dynamic behavior, including stiffness and cross-axis stabilities, are included. (Contains 14 citations)

13J. Marine Engineering

AD-A084 989/3 PC **A03**/MF **A01**
Naval Research Lab Washington DC
Failure Analysis of Roller Chain Drives.
Memorandum rept.,
F. R. Stonesifer, H. L. Smith, and D. A. Meyn. 4 Apr 80, 28p NRL-MR-4202, AD-E000 422

Results from the NAVSEA sponsored task to analyze failures of a roller-chain drive are reported. Several unexpected failures had occurred after relatively short exposure to sea water. This led to an inspection of the broken parts and fracture surfaces in an effort to determine causes of failure. The static breaking strength and fatigue life of the chain were determined by laboratory tests. Both optical and scanning electron micrographs were used in the analysis. Results show tensile overloading to be the principal cause of failure. However stress corrosion cracking may have reduced the useful life of the case hardened roller-chain pins. Modifications to improve the integrity of the system are recommended. (Author)

AD-A085 352/3 PC **A02**/MF **A01**
Naval Surface Weapons Center Silver Spring MD
Nondestructive Inspection of Longitudinal Stiffener Butt Welds in Commercial Vessels.
Final rept.,
R. Youshaw. Feb 80, 13p SSC-295
Contract MIPR-Z70099-6-71375

A study has been made of the butt welds which join together the sections of longitudinal stiffeners in longitudinal framed ships. From a review of Coast Guard casualty reports and a survey of major shipbuilders, it was determined that there is very little evidence of structural failure in service and, therefore, no need at this time to expand nondestructive inspection to include this type of weld joint. (Author)

AD-A085 356/4 PC **A04**/MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Ocean Engineering
Review of Fillet Weld Strength Parameters for Shipbuilding.
Final rept.,
C-L Tsai, K. Itoga, A. P. Malliris, W. C. McCabe, and K. Masubuchi. Feb 80, 65p SSC-296
Contract DOT-CG-71455-A

This report presents the results of a review of the current fillet weld specifications of the various classification societies and a developmental procedure for analyzing these rules by a rational method for establishing required weld size, and recommendations for further research. The results indicated large deviations among rules which relate the fillet weld size to the thickness of the base plate. The required fillet weld size by the most conservative rule may be two times that required by the most liberal rule. There appears to be a need for reviewing these rules more closely by analytical means. A computer program, named 'Automatic Dynamic Incremental Nonlinear Analysis (ADINA)', was used to determine the stress distributions in the welds of tee-joints under simple tension acting along the edges of the flange. This program could be used in determining the minimum weld sizes. A detailed explanation of the rationale of using (ADINA' program or similar FEM program is presented in this report. (Author)

AD-A085 454/7 MF **A01**
Coast Guard Washington DC
Booklet of General Plans. U.S. Coast Guard Cutters, 82BWPB-0103-9.
10 May 61, 36p
Availability: Microfiche copies only.

No abstract available.

AD-A085 467/9 PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD
An Assessment of Representations of Long- and Short-Term Ocean Wave Spectra and Ship Response Predictions.
Final rept.,
Ming-Shun Chang. Jun 80, 48p Rept no. DTNSRDC-80/009

This paper presents a review of the present method for predicting ship responses in a seaway. The applicability of the existing wave spectral representations for global ship response predictions are discussed, and problems associated with the extreme response predictions are illustrated. The study indicates that the errors induced by the use of different spectral representations are of the same order of magnitude as the errors generated from the other assumptions used in the prediction scheme. (Author)

AD-A085 468/7 PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD
A Roll, Fin, and Fin Controller Prediction Computer Program.
Final rept.,
Susan L. Bales, John R. Tucker, and Geoffrey G. Cox. Jun 80, 63p Rept no. DTNSRDC-80/014

A series of computer program is under development for use in the design and evaluation of roll stabilization devices. This report is the user manual for the first program that has been completed. Identified by the acronym FINCON, the program is based on the work of Cox and Lloyd published in Volume 85 of the transactions of the Society of Naval Architects and Marine Engineers. FINCON predicts stabilized and unstabilized ship roll motion, bilge keel and antiroll fin sizing effects, and the influence of fin controller characteristics by use of a one degree-of-freedom roll-motion equation. Nonlinear roll damping characteristics, derived from model experiments or by other means, are incorporated by a combination of equivalent linearization and an iteration procedure. Results are predicted for short-crested seas (for stabilizer design purposes) and long-crested seas, which are described by two-parameter Bretschnieder wave spectra. (Author)

AD-A085 556/9 Not available NTIS
British Ship Research Association Wallsend (England) Wallsend Research Station
Journal of Abstracts of the British Ship Research Association. Volume 34, Number 9, Abstracts 51,323-51,502,
R. C. Kahler. Sep 79, 53p
See also Volume 34, Number 8, AD-A078 409.
Availability: B.S.R.A., Wallsend (England), Wallsend Research Station p503-553 Sep 79 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A085 567/6 PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD Ship Performance Dept
SWATH 6D Model Experiments in Regular Head and Following Waves with and without Floodable Struts.
James A. Kallio. Feb 80, 41p Rept no. DTNSRDC/SPD-0914-01

Experiments were conducted with a model of a tandem strut small waterplane area twin hull ship in the Carriage II Facility of the David W. Taylor Naval Ship Research and Development Center (DTNSRDC) to determine motions and accelerations at various speeds and two headings. Data were obtained in regular waves for model configurations with the struts intact and for the struts with 40% of the waterplane area flooded. Experimental results are compared with those for previously tested strut configurations with the same model lower hulls. Pitch and relative bow motions for the intact strut configuration decrease dramatically in head seas as speed increases up to 26 knots. Flooding about 40% of strut waterplane area resulted in a large increase in natural heave, pitch and roll periods and a decrease in pitch, relative bow and vertical motions for the craft operating in head seas at up to 20 knot speeds. (Author)

AD-A085 591/6 PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD Ship Performance Dept
Wake Scale Effects and Propeller Hull Interaction: State of the Art.
Final rept.,
Carl Scragg. Feb 80, 50p Rept no. DTNSRDC/SPD-0829-02

This survey reviews the progress of research on the dual problems of wake scale effects and hull propeller interactions. The survey covers theoretical, empirical and experimental results. The state of the art is defined in terms of those hull forms which have wakes which can be adequately predicted using currently available techniques. Suggestions of the manner in which the state of the art might be extended are presented. (Author)

AD-A085 655/9 PC **A17**/MF **A01**
Science Applications Inc McLean VA
Developing Tanker Casualty and Tanker Traffic Databases for 1969-1977.
Final rept. 1969-1977.
30 Nov 79, 384p USCG-M-80-5
Contract DOT-CG-800288-A

This report presents the results of a program to develop and analyze two databases. The first was to extend the existing Coast Guard Tanker Casualty File (1969-1973) for an additional four years (1974-1979). Incorporated with the extension of the data was an expansion of database to include a broader range of information related to the sequence of the casualty, extent of pollution, damages incurred, and identification of the source of the casualty information. The second database developed was a file of tanker movements, based on a computerized version of the 'Lloyd's Voyage Record' for the year ending December 1976. This file contains a series of records listing dates and location changes for each tanker during this year. The development of this second database permits the casualty statistics to be related to various vessel and crew measures of exposure, e.g., polluting casualties per ton of oil transported per mile, etc. Finally the report contains a trend analysis of the tanker casualty database. Oil outflow from polluting casualties is examined from the standpoint of tanker size, tanker age, geographic location, area (pier, harbor, open sea, etc.) and flag of registry. The distribution of repair costs by casualty type and the sequence of events preceding tanker sinkings are also examined. (Author)

AD-A085 749/0 PC **A12**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD Computation Mathematics and Logistics Dept
Feasibility Model of CASDAC Level IV/V Top-Down Analysis.
Final rept.,
R. Jenkins, and B. M. Thomson. Apr 79, 253p
Rept no. DTNSRDC/CMLD-79/06

This study defines the 'top-level' functional structure of CASDAC (Computer-Aided Ship Design and Construction) Level IV/V. The definition is accomplished by using a hierarchically structured modeling technique to examine the top levels of each of the six individual functional systems which have been identified as the principal components of CASDAC Level IV/V. These six functional systems address the following areas of ship design and construction: Hull (HULDAC); Machinery (CAMDAC); Piping (CAPDAC); Electrical/Electronic (ELXDAC); Heating, Ventilation, and Air-Conditioning (CAVDAC); and Handling (HANDAC). The study was restricted to the top three functional levels from a total potential of perhaps ten levels. The study identifies the areas of responsibility of the individual functional systems, identifies data within these systems, and examines the interfaces between the detail design functional systems and Level III subsystems. Data were gathered, organized, and presented for each of the functional systems using the Hierarchical Input Process Output (HIPO) methodology. These HIPO diagrams comprise the core of this study and were used in developing the findings and recommendations. (Author)

PAT-APPL-6-142 796 PC **A03**/MF **A01**
Department of the Navy Washington DC
Bow Dock.
Patent Application,
Timothy A. Knowles. Filed 22 Apr 80, 31p AD-D007 232/2
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A bow dock for use in a two step docking method to allow the repair or replacement of a sonar dome rubber window on a variety of classes of full draft vessels in harbors and other water of limited depth. The bow dock is provided with docking pedestals and alignment fenders which mate with docking brackets and fenders on the vessel to be docked. Each docking pedestal is provided with an electronic load cell to monitor the pedestal load during docking. The stern gate is fitted with an auxiliary gate and inserts designed to mate with the hull configuration of each vessel class. The stern gate is also provided with a slotted pivot hinge to facilitate sealing of the stern gate to the dock by hydrostatic pressure. (Author)

PAT-APPL-6-147 440 PC **A02**/MF **A01**
Department of the Navy Washington DC
Self-Contained Backflush/Start System for Suction LFC Undersea Vehicle.
Patent Application,
Kenneth H. Rogers. Filed 7 May 80, 10p AD-D007 237/1
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A clean start backflush system provides a mode of operation in a suction laminar flow control (LFC) vehicle in which low speed propulsion and backflush through surface apertures are simultaneously generated. The propulsion assists the transition from an at-rest state to the desired high-speed travel, while backflush in the low-speed regime ensures that ocean particles are not captured at the entrance to the flush suction slots. (Author)

PB80-198344 PC **A08**/MF **A01**
Ketron, Inc., Arlington, VA.
Least-Energy Operation of River Shipping. Volume II. Detailed Analyses. Volume III. Appendices.
Final rept. Jun 76-Jan 79,
Fendall Marbury. 30 Jan 80, 173p KFR-192-78-VOL-2/3, MA-RD-930-80032
Contract MA-6-38046
See also Volume 1, PB80-191265. Prepared in cooperation with American Waterways Operators, Arlington, VA.

This study covers the line-haul phase of river shipping. Methods have been derived for determining the best speeds at which to operate river shipping equipment in order to minimize fuel consumption per mile, (or per barge-mile, or per ton-mile), or to minimize line-haul cost per mile, etc. These best speeds depend on downstream, swiftness of current, and depth of water. This methodology will prescribe a best speed for each reach of a river, given the equipment used, its fuel rates and costs.

13K. Pumps, Filters, Pipes, Fittings, Tubing and Valves

AD-A085 449/7 PC **A02**/MF **A01**
Civil Engineering Lab (Navy) Port Hueneme CA
Anacapa Island Split Pipe Installation Inspection and Repair, 1978-1979.
Final rept. Oct 78-Sep 79,
W. R. Tausig, and R. L. Brackett. Feb 80, 21p
Rept no. CEL-TN-1571

The U.S. Navy currently maintains and operates numerous underwater power and signal cables. Most of the these cables utilize split pipe systems to protect the cable from damage in the surf zone and when crossing exposed rocky seafloors. Past experience has shown that the hardware used to install the split pipe system lacks the reliability and maintenance-free operation required for the life of the cables. Based on previous experience with cable failures, the areas determined to be in greatest need of investigation are fasteners for holding the split pipe halves together, immobilization of the pipe, and cathodic protection for the entire system. As a result, CEL tested prototype and commercially available hardware components which appeared to be suitable replacements for the existing split pipe hardware. The candidate hardware was then used in a 300-foot-long test section of split pipe installed March 1976 at Anacapa Island, to be inspected during a five-year-period. This report presents the results of the October 1978 inspection conducted 2-1/2 years after installation of the test system. Also discussed is the repair operation conducted in March 1979 to replace those sections of split pipe which were damaged during a severe storm in January 1978. (Author)

AD-A085 550/2 PC **A02**/MF **A01**
School of Aerospace Medicine Brooks AFB TX
Development, Test and Evaluation of an Advanced Anti-G Valve for the F-15,
Final rept. 1 Jan 77-1 Jan 79,
R. R. Burton, R. M. Shaffstall, and J. L. Jaggars. 1980, 8p Rept no. SAM-TR-79-427
Pub. in Aviation, Space and Environmental Medicine, v51 n5 p504-509 May 80.

No abstract available.

AD-A085 728/4 PC **A07**/MF **A01**
Foreign Technology Div Wright-Patterson AFB OH
Construction Norms Straightened. Part II. Section D. Gas Supply External Networks and Constructions of the Norm of Planning. Chapter 13,
L. T. Kalacheva, V. M. Rodionova, and L. P. Biryukova. 16 May 80, 141p Rept no. FTD-ID(RS)T-0428-80
Unedited machine trans. of Stroitel'nyye Normy i Pravila, Chast II, Razdel D, Glava 13, Gazosnabzheniye Naruzhnyye Seti i Sooruzheniya Normy Proyektirovaniya SNIP II-D (USSR) 13-66 p1-35 1967. See also Part 2, Section G, Chapter 12, AD-A085 843

No abstract available.

N80-25697/7 PC **A03**/MF **A01**
Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium).
Computer Program for Elastic Analysis of Piping Systems with Special Reference to the Power Piping Code B31.1.
D. Vanleeuwen. Apr 80, 37p MT-135

The program CRIF-PIPE is a user oriented computer program designed to run on a minicomputer. It allows the user to model efficiently an arbitrary three dimensional piping system and analyze the stresses and flexibility of different situations of the system with regard to thermal and mechanical loading. The theoretical basis is an elastic linear finite element model of the pipeline with linearly varying bending moments. The finite element stiffness method is particularly suited to complex systems involving many anchors, closed loops, interconnecting branch lines, and intermediate and terminal full, or partial restraints. The calculated stresses are compared to allowable stress levels described by the American power piping code B31.1.

PATENT-4 202 369 Not available NTIS
Department of the Air Force Washington DC
Gas Relief Valve Design for Low Temperature.
Patent,
Joseph T. Viravec, and Maurice A. Hoyt. Filed 15 Jun 78, patented 13 May 80, 6p AD-D007 281/9, PAT-APPL-916 024
Supersedes PAT-APPL-916 024-78, AD-D005 216.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A relief valve is provided with slots across the end of the valve stem where contact is made with the valve body to eliminate gas pressurization in the annular area bounded by circumferential contact between the valve stem and the body and a smaller diameter circumferential contact between valve seat/seal members. This construction prevents any leakage gas from becoming trapped between the valve stem and the container which would lower the design cracking pressure thereby adversely affecting the operation of the relief valve. (Author)

13L. Safety Engineering

AD-A085 626/0 Not available NTIS
Polytechnic Inst of New York Farmingdale
Safety Metrics and Human Operator Control of Complex Systems,
Martin L. Shooman. 1979, 6p
Contract N00014-75-C-0858
Availability: Pub. in Proceedings of the International System Safety Conference (4th), p161-166 Jul 79 (No copies furnished by DTIC/NTIS).

No abstract available.

PB80-194798 PC **A07**/MF **A01**
National Bureau of Standards, Washington, DC. National Engineering Lab.
A Computerized Approach for Identifying Cost-Effective Fire Safety Retrofits in Health Care Facilities.
Final rept.,
Robert E. Chapman, William G. Hall, and Phillip T. Chen. Jan 80, 126p NBSIR-79-1929

The study focuses on how a computerized version of the Fire Safety Evaluation System developed by the Center for Fire Research at the National Bureau of Standards can be used to determine equivalence to the Life Safety Code in the least costly manner. This study presents a programmer-oriented discussion of the mathematical, economic and engineering considerations that went into the development of the linear programming algorithm for identifying cost-effective retrofits. Programmer-oriented topics treated in this report include: a discussion of user options; program documentation; format statements; flow charts; sample computer runs; and a complete listing of the computer program.

PB80-195340 PC **A11**/MF **A01**
Wilco, Inc., Stillwater, MN.
Mechanical Power Press Safety Engineering Guide.
Sep 76, 230p
Contract PHS-NIOSH-210-75-0042

This guide explores the technical, behavioral, and ergonomic aspects of mechanical power press safety as it pertains to workers who set dies on, operate, and maintain presses. Various safeguarding systems are evaluated and recommendations are given for proper use to safeguard the press worker from various hazards including the inherent hazard of a press, which is the hazard of being injured at the point of operation. Each safeguarding system is described. Installation instructions and recommendations are outlined. Maintenance instructions are covered in order to assure that the system is properly maintained so as not to compromise its safeguarding performance. Advantages and disadvantages of each system are given as an aid to the safety professional when he has to make a safeguarding system decision. An installation checklist is provided to ensure proper installation. A safety inspection checklist is provided and must be completed at specified intervals to ensure continued proper operation and safeguarding integrity of the system. A special section is devoted to information that will aid the safety professional to reach a decision as to which safeguarding system is best suited to his particular presses. A safety responsibilities section delineates the particular responsibilities of each group of people who are involved with presses in the hope that their involvement will be both safe and productive.

PB80-195837 PC **A04**/MF **A01**
Allen Corp. of America, Alexandria, VA.
Validation of the Reduction of Rear-End Collisions by a High-Mounted Auxiliary Stoplamp.
Final rept. 30 Sep 77-21 May 80,
Raymond E. Reilly, David S. Kurke, and C. C. Buckenmaier, Jr. May 80, 53p DOT-HS-805 360
Contract DOT-HS-7-01756

The study was a field validation of the effectiveness of an auxiliary high-mounted stoplamp in reducing rear-end collisions. A previous study (DOT-HS-803-467), using taxicabs, found a 54 percent reduction in relevant rear-end impacts to vehicles equipped with the auxiliary stoplamp. The present study used 5,400 telephone company passenger vehicles, half test, half control, which accumulated 55 million miles during a 12-month continuous data collection period. The results showed a statistically significant 53 percent reduction in relevant rear-end impact rate in the test group as compared to the control group. The findings were thus consistent with the previous study on taxicabs.

PB80-812738 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Municipal Fire Departments. 1964-June, 1980 (A Bibliography with Abstracts).
Rept. for 1964-Jun 80,
Edith Kenton. Jul 80, 349p
Supersedes NTIS/PS-79/0688 and NTIS/PS-78/0687.

Materials are presented on urban fire stations, equipment, planning, methods, and personnel. The discussions cover operations; the selection and testing and training of firemen; pumps, ladders, hydrants, hoses, extinguishers, techniques, and vehicles; mathematical models and computerized technology; fire research on buildings, materials, and combustion; and toxic combustion products. Also reported are integrated municipal information systems, community facilities, regional planning, emergency services, protective clothing, fire rescue, and projects in specific urban localities. (This updated bibliography contains 342 abstracts, 145 of which are new entries to the previous edition.)

13M. Structural Engineering

AD-A084 936/4 PC **A05**/MF **A01**
Pisa Univ (Italy) Ist di Aeronautica
The Fatigue Crack Growth under Variable Amplitude Loading in Built-up Structures.
Annual technical rept. no. 1, Sep 78-Oct 79,
A. Salvetti, G. Cavallini, and L. Lazzeri. Nov 79, 87p
Grant DA-ERO-78-G-107

The object of this investigation is the development of a reliable procedure for evaluating the growth of a crack in a built-up structure under realistic loading conditions. To this end tests have been conducted on stiffened and unstiffened panels to monitor the growth of a crack both under constant and variable amplitude loads. The test data has been evaluated on the basis of a deep theoretical analysis which has allowed us to reach significant results on the following main topics: - influence of the fastener flexibility and stringer-sheet friction forces on fatigue crack propagation in stiffened panels, - reliability of existing methods for predicting the growth of a crack under loading conditions in plain sheets.

AD-A085 446/3 PC **A02**/MF **A01**
Civil Engineering Lab (Navy) Port Hueneme CA
Concrete Sandwich Construction for Energy Conservation.
Final rept. Oct 75-Sep 78,
John R. Keeton. Mar 80, 19p Rept no. CEL-TN-1574

An abbreviated research study on use of shrinkage-compensating expansive concrete in sandwich-type wall and roof panels containing insulation at mid-thickness is described. The use of expansive concrete is shown to be a technically viable concept for eliminating shrinkage cracking, thus preventing moisture penetration which can reduce insulation effectiveness, cause deterioration of the insulating material, and accelerate steel corrosion. Embeddable resistance strain gages proved to be reliable for measuring expansion and subsequent shrinkage of the experimental panels. As a result of this study, a comprehensive research program is proposed for experimental verification of design and field control measures that will permit the use of shrinkage-compensating cement mortars in sandwich panel construction. (Author)

AD-A085 489/3 PC **A04**/MF **A01**
Naval Postgraduate School Monterey CA
On Combinations of Radom Loads.
Technical rept.,
D. P. Gaver, and P. A. Jacobs. Jan 80, 51p Rept no. NPS55-80-006

Structures are subject to changing loads from various sources. In many instances these loads fluctuate in time in an apparently random fashion. Certain loads vary rather slowly (called constant loads); other loads occur more nearly as impulses (shock loads). Suppose that the stress put on the structure by various loads acting simultaneously can be expressed as a linear combination of the load magnitudes. In this paper certain simple but somewhat realistic probabilistic load models are given and the resulting probabilistic model of the total stress on the structure caused by the loads is considered. The distribution of the first time until the stress on the structure exceeds a given level x, and the distribution of the maximum stress put on the structure during the time interval (0,t) are studied. Asymptotic properties are also given. It is shown that the asymptotic properties of the maximum stress are related to those of the maxima of a sequence of dependent random variables. Classical extreme value type results are derived under proper normalization. (Author)

AD-A085 730/0 PC **A05**/MF **A01**
Daedalean Associates Inc Woodbine MD
The Research and Development of a Cavitating Water Jet Cleaning System for Removing Marine Growth and Fouling from Offshore Platform Structures.
Final rept.,
James T. Parker, II , William H. Bohli, and A. P. Thiruvengadam. Dec 79, 94p ONR-169-009-3F
Contract N00014-77-C-0367

The objective of this program was to develop the technology to demonstrate the use of controlled cavitation erosion to remove marine growth from off-shore structures. The major advantage of a cavitation system would be the smaller energy input requirement. Commercial systems are available but they require three to four times the energy in order to accomplish the same task. Through the use of cavitation technology small, lightweight components which will conserve energy can be utilized. The following engineering parameters were evaluated in order to demonstrate the use of controlled cavitation erosion, CONCAVER, technology: (1) nozzle distance (Dn); (2) nozzle design; (3) nozzle velocity (Vo); (4) intensity of cavitation erosion (Ie); (5) water depth (d); and (6) nozzle horsepower (HPm). The family of data curves were gathered which allowed optimization of the test conditions and equipment in order to obtain the maximum cleaning rate. Once the most effective nozzle design was determined, the other parameters were evaluated both in the laboratory and in field tests in order to maximize the surface area cleaned with respect to time. (Author)

N80-25695/1 PC **A05**/MF **A01**
Saab-Scania, Linkoping (Sweden).
Buckling of Sandwich Panels Subjected to Axial Compression, Shear Forces and Lateral Pressures. Part 2: Analysis.
S. E. Larsson, H. Bengtsson, and S. Oeberg. 1980, 79p SAAB-TN-AE-72-BT-2

The Aerospace Division of SAAB-SCANIA initiated in 1962 a comprehensive study on analysis and testing of sandwich panels subjected to combined in-plane and normal loading. The investigation was related to bonded panels with aluminum skins and aluminum honeycomb core. The purpose of the investigation was to develop and verify analysis methods applied in the stress and strength analysis of honeycomb panels used in aircraft primary structures.

N80-25698/5 PC **A03**/MF **A01**
Stuttgart Univ. (Germany, F.R.). Inst. fuer Statik und Dynamik.
Applications in Structural Analysis.
Oct 78, 49p ISD-251
Presented at Uua/E 7TH Sig Symp. On Appl. In Struct. Anal., Nice, 2-4 Oct. 1978.

No abstract available.

PB80-194046 PC **A03**/MF **A01**
Institute for Building Science, Budapest (Hungary).
Choice of Technology at Project Level. Proceedings of the Ad-Hoc Expert Group Meeting on Criteria for the Selection of Appropriate Building Technologies Held at Amman, Jordan on December 10-14, 1977,
Emanuel Csorba. 30 Nov 77, 49p

Sponsored in part by Agency for International Development, Washington, DC.

This paper views the building as an integrated product of various technologies. It discusses flow diagram and hierarchy of building technologies, main factors to be considered when choosing appropriate technologies for building materials industries and for construction activities at project level. Emphasized are building materials production technologies; prefabricated building units production technologies; prefabricated load-bearing structure production technologies; complementary building structures prefabrication technologies; and rationalized monolithic technologies.

PB80-196512 PC **A11/MF A01**
National Bureau of Standards, Washington, DC. National Engineering Lab.
Development of a Probability Based Load Criterion for American National Standard A58, Building Code Requirements for Minimum Design Loads in Buildings and Other Structures.
Final rept.,
Bruce Ellingwood, Theodore V. Galambos, James G. MacGregor, and C. Allin Cornell. Jun 80, 232p NBS-SP-577
Prepared in cooperation with Washington Univ., St. Louis, MO. Dept. of Civil Engineering; Alberta Univ., Edmonton. Dept. of Civil Engineering; and Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.

Recommended load factors and load combinations are presented which are compatible with the loads recommended in the proposed 1980 version of American National Standard A58, Building Code Requirements for Minimum Design Loads in Buildings and Other Structures (ANSI A58.1-1980 D). The load effects considered are due to dead, occupancy live, snow, wind and earthquake loads. The load factors were developed using concepts of probabilistic limit states design which incorporate state-of-the-art load and resistance models and available statistical information. Reliabilities associated with representative structural members and elements designed according to current (1979) structural specifications were calculated for reinforced and prestressed concrete, structural steel, cold-formed steel, aluminum, masonry and glued-laminated timber construction. The report presents the rationale for selecting the criterion format and load factors and describes the methodology to be followed by material specification groups for determining resistance factors consistent with the implied level of reliability and the statistical data. The load factors are intended to apply to all types of structural materials used in building construction.

14. METHODS AND EQUIPMENT

14A. Cost Effectiveness

AD-A085 402/6 Not available NTIS
Polytechnic Inst of New York Farmingdale
Tutorial on Software Cost Models.
Martin L. Shooman. 1979, 19p
Contracts F30602-78-C-0057, N00014-75-C-0858
Availabilty: Pub. in Workshop on Quantitative Software Models, p1-19 Oct 79 (No copies furnished by DTIC/NTIS).

No abstract available.

14B. Laboratories, Test Facilities, and Test Equipment

AD-A085 286/3 PC **A03/MF A01**
Civil Engineering Lab (Navy) Port Hueneme CA
A Thin Film Thermal Sensor for Measuring Ocean Currents.
Interim rept. Jul 76-Jul 79,
T. R. Kretschmer, B. C. Streets, and A. P. Smith. Nov 79, 43p Rept no. CEL-TN-1564

A thin film thermal sensor is being developed to improve U.S. Navy capabilities for measuring ocean current profiles. Using the sensor, current velocity is determined by measuring the resistance changes in each of four platinum films positioned on the surface of the cylindrical sensor substrate. Development of this device into a practical oceangoing tool has involved overcoming substrate fragility, water leakage problems, and biofouling contamination. A high-strength ceramic substrate has been selected to improve ruggedness. New coating systems to prevent water penetration into the sensor are being developed and evaluated. An electrolytic hypochlorite generation technique has been developed to prevent biofouling indefinitely on the sensor surface. Tests have shown the sensor produces repeatable results in the laboratory and agrees well with commercial current meter measurements during ocean testing. (Author)

AD-A085 374/7 PC **A02/MF A01**
Wayne State Univ Detroit MI Dept of Physics
Subsurface Flaw Detection in Metals by Photoacoustic Microscopy,
R. L. Thomas, J. J. Pouch, Y. H. Wong, L. D. Favro, and P. K. Kuo. 14 Sep 79, 7p ARO-15746.3-MS
Grant DAAG29-78-G-0182
Pub. in Jnl. of Applied Physics, v51 n2 p1152-1156 Feb 80.

No abstract available.

AD-A085 488/5 PC **A03/MF A01**
Royal Aircraft Establishment Farnborough (England)
A Time-Sharing Computer Program to Drive up to Three Independent Fatigue Testing Machines.
Technical rept.,
W. Watt. May 79, 32p RAE-TR-79054, DRIC-BR-70107

WG is a PDP-8/E computer program which offers a choice from seven resident software sequence generators to each of three independent hardware waveform controllers which drive electrohydraulic fatigue testing machines. The program is controlled by teletype commands and paper tape input data. Under program control, each controller may be run at a specified fixed frequency or fixed loading rate. Various analysis counts are kept which may be typed on command. One generator takes its sequence of magnetic tape and is restricted to one controller at at ime. Another version of WG may be produced, which will run five waveform controllers and two magnetic tape units. (Author)

AD-A085 518/9 PC **A04/MF A01**
GARD Inc Niles IL
Acoustic Emission Weld Monitor System. Data Acquisition and Investigation.
Final rept. Oct 78-Sep 79,
R. A. Groenwald, T. A. Mathieson, and C. T. Kedzior. Oct 79, 71p TARADCOM-TR-12468
Contract DAAK30-78-C-0123

The standard weld inspection techniques of radiography and ultrasonics have intrinsic disadvantages. The new technology of acoustic emission (AE) has shown an applicability to weld inspection which could overcome such disadvantages. This program is directed at utilizing acoustic-emission as a weld monitoring technique on a specific Army welding application. The reported work is phase 1 of an Army program to develop a microprocessor-based Acoustic Emission Weld Monitor (AEWM) for the purpose of in-process monitoring of armor plate welding. The intended use of this AEWM is to monitor the production welding performed in the fabrication of heavy armored vehicles. The objectives of this phase are to: (a) perform laboratory MIG welding of armor plate with controlled induction of critical flaws, (b) collect acoustic emission data generated during the welding, (c) perform a data analysis to correlate the recorded AE data with flaw presence, and (d) predict the accuracy with which AE is able to detect and locate the weld flaws as well as discriminate between flaw types.

AD-A085 721/9 PC **A02/MF A01**
Army Armament Research and Development Command Aberdeen Proving Ground MD Chemical Systems Lab
Determination of Aspirated Aerosol Sampler Efficiencies using Laser Reference Techniques.
Technical rept. Feb-Sep 79,
Hugh R. Carlon, David V. Kimball, and Robert J. Wright. Apr 80, 21p ARCSL-TR-80003, AD-E410 266

Aerosol sampling is a complicated problem in aersol physics. A technique is described to continuously monitor the mass concentration of monodisperse test aerosols using a He:Ne laser. Precise approximations are possible from the Mie theory. The method is fast and accurate, and it eliminates the need for precalibration of a 'standard' sampler against which candidate samplers must be compared. It is not limited to sampler efficiency measurements but can be used wherever it is desirable to continuously monitor test aerosols of spherical droplets, e.g., in studies of the human respiratory system.

AD-A085 747/4 PC **A05/MF A01**
Cornell Univ Ithaca NY Dept of Structural Engineering
Numerical Solutions for Coupled Magnetomechanics.
Interim technical rept. 1 Feb 79-31 Jan 80,
Kuan-Ya Yuan, Francis C. Moon, and John F. Abel. 1 Feb 80, 87p Rept no. 80-5
Contract N00014-79-C-0224

This technical report describes the accomplishments of the first year of a research project directed toward developing numerical methods for the coupled analysis of forces, currents, and stresses in thin elastic structures exposed to time-dependent magnetic fields. To date research has focused on the response of flat plates to steady state harmonic and pulsed fields. A stream function for the induced eddy currents is used to reduce the three-dimensional electromagnetic problem to an integro-differential equation in two dimensions.

AD-A085 753/2 PC **A07/MF A01**
Illinois Univ At Urbana-Champaign Coordinated Science Lab
Study of a Computer Assisted Test Program.
Technical rept.,
Adel A. Sakla. Dec 79, 136p Rept nos. R-869, UILU-ENG-78-2263
Contracts N68335-78-C-0524, N00014-79-C-0424

As systems become more and more complex, the need for good fault diagnostic procedures becomes more obvious. In recent years much work has been done on the fault analysis of digital circuits, primarily because the growth in the size of these circuits has necessitated good fault diagnostic tests. The two state nature ('1' or '0') of digital circuits has also made them more amenable to the development of reasonably simple and reliable test procedures. In contrast, research on fault diagnostic procedures for analog circuits has not been as fruitful, nor have the pressures to develop good fault diagnostic tests for analog circuits been as great due to their relatively small number of components in comparison with digital systems. (Author)

AD-A085 755/7 PC **A03/MF A01**
Drexel Univ Philadelphia PA Dept of Mechanical Engineering and Mechanics
Flaw Classification in Welded Plates with a Microprocessor Controlled Flaw Detector.
Annual rept. no 1,
Joseph L. Rose, J. Bruce Nestleroth, and Edward G. Poplawski. 22 Feb 80, 35p
Contract N00014-77-C-0607

The purpose of this paper is to manifest that a microprocessor, when utilized in connection with an ultrasonic flaw detector, can reliably regulate an ultrasonic inspection process. By virtue of several concentrated laboratory trials and accompanying analysis with the microprocessor-flaw detector combination, it will be demonstrated that dependable, speedy, and cost effective flaw detection is within the realm of reality. Specifically, this particular study focuses on the microprocessor controlled evaluation of steel plates. While it is true that the overall procedure employed here involved itself with flaw classification in one area (welds in steel plates), it will become apparent that applications are not restricted to steel plates. Cognizant of this fact, this paper will also provide insight into other areas pertinent to the study. (Author)

AD-A085 777/1 PC **A04/MF A01**
TRITEC Inc Columbia MD

Development of a Fluidic Gas Concentration Sensor.
Final rept.,
George E. Stevens, and Maurice F. Funke. 16 Jun 80, 59p HDL-CR-80-103-1
Contract DAAG39-78-C-0103

This document is the final report of a program to design, test, and evaluate the performance of fluidic gas concentration sensing systems and their component parts for monitoring CxHy and H2S on offshore platforms. This program consisted of investigating three major portions of a systems. Gas Sensors, Chemical Processors, Sensor System, Three candidate fluidic sensors (Resistor Bridge Sensor, Vortex Sensor, Jet Edge Resonator Oscillator Sensor) were evaluated for use in the sensor system. The resistor bridge sensor was chosen as the most appropriate. Several chemical processors were evaluated for each gas sensing system. Palladium coated alumina was chosen for the CxHy system and lead acetate was chosen for the H2S system.

DOE/NASA/3222-80/1 PC **A05**/MF **A01**
Cleveland State Univ., OH.
Error Analysis in the Measurement of Average Power with Application to Switching Controllers.
J. E. Maisel. Mar 80, 85p NASA-CR-159792
Contract EC-77-A-31-1044

Power measurement errors due to the bandwidth of a power meter and the sampling of the input voltage and current of a power meter were investigated assuming sinusoidal excitation and periodic signals generated by a model of a simple dc/dc chopper system. Errors incurred in measuring power using a microcomputer with limited data storage were also considered. In this investigation, the behavior of the power measurement error due to the frequency responses of first order transfer functions between the input sinusoidal voltage, input sinusoidal current and the signal multiplier was studied. Results indicate that this power measurement error can be minimized if the frequency responses of the first order transfer functions are identical. The power error analysis was extended to include the power measurement error for a model of a simple dc/dc chopper system with a dc power source and an ideal shunt motor acting as an electrical load for the chopper. The behavior of the power measurement error was determined as a function of the chopper's duty cycle and back emf of the shunt motor. Results indicate that the error is large when the duty cycle or back emf is small. Theoretical and experimental results indicate that the power measurement error due to sampling of sinusoidal voltages and currents becomes excessively large when the number of observation periods approaches one-half the size of the microcomputer data memory allocated to the storage of either the input sinusoidal voltage or current. (ERA citation 05:022365)

EGG/LTR-LO-87-79-128 PC **A04**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Evaluation of Installed Instrumentation for Liquid Level Measurements.
J. P. Adams, V. E. Flitton, and L. D. Goodrich. 20 Dec 79, 53p
Contract EY-76-C-07-1570

An evaluation is presented of the capability of several installed LOFT instruments to measure liquid level. This evaluation was accomplished by comparing thermocouples, neutron detectors, and differential pressure transducers with the LOFT liquid level transducers. A brief discussion of a heated differential thermocouple liquid level transducer is also presented. (ERA citation 05:021101)

N80-25294/3 PC **A04**/MF **A01**
Yale Univ., New Haven, CT. Dept. of Engineering and Applied Science.
Study of Experiments on Condensation of Nitrogen by Homogeneous Nucleation at States Modelling Those on the National Transonic Facility.
Final Report.
P. P. Wegener. May 80, 58p NASA-CR-163217
Grant NSG-1612

A cryogenic wind tunnel is based on the twofold idea of lowering drive power and increasing Reynolds number by operating with nitrogen near its boiling point. There are two possible types of condensation problems involved in this mode of wind tunnel operation. They concern the expansion from the nozzle supply to the test section at relatively low cooling rates, and secondly the expansion around models in the test section. This secondary expansion involves higher cooling rates and shorter time scales. In addition to these two condensation problems it is not certain what purity of nitrogen can be achieved in a large facility. Therefore, one cannot rule out condensation processes other than those of homogeneous nucleation.

N80-25352/9 PC **A03**/MF **A01**
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (Germany, F.R.). Inst. fuer Entwurfs-Aerodynamik.
Experimental Investigation of the Particle-Number Concentration in the Wind Tunnel for Use of the Laser Anemometry.
H. Bessling, R. Kiock, C. Helsper, and H. Fissan. Jun 79, 49p DFVLR-FB-79-28, ESA-TT-647
Text in German; English Summary. Report Will Also Be Also Announced as Translation (Esa-TT-647).

The conditions under which it becomes possible to measure the velocity of particles in wind tunnels using laser anemometry were studied. Experiments, which were carried out in a high speed cascade wind tunnel, showed that the natural load of particles was insufficient and that the steady addition of an aerosol was necessary to use this method.

N80-25615/9 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
Effects of Various Assumptions on the Calculated Liquid Fraction in Isentropic Saturated Equilibrium Expansions.
J. W. Bursik, and R. M. Hall. Jun 80, 33p NASA-TP-1682, L-13437

The saturated equilibrium expansion approximation for two phase flow often involves ideal-gas and latent-heat assumptions to simplify the solution procedure. This approach is well documented by Wegener and Mack and works best at low pressures where deviations from ideal-gas behavior are small. A thermodynamic expression for luquid mass fraction that is decoupled from the equations of fluid mechanics is used to compare the effects of the various assumptions on nitrogen-gas saturated equilibrium expansion flow starting at 8.81 atm, 2.99 atm, and 0.45 atm, which are conditions representative of transonic cryogenic wind tunnels. For the highest pressure case, the entire set of ideal-gas and latent-heat assumptions are shown to be in error by 62 percent for the values of heat capacity and latent heat. An approximation of the exact, real-gas expression is also developed using a constant, two phase isentropic expansion coefficient which results in an error of only 2 percent for the high pressure case.

PAT-APPL-6-132 451 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Light-Scattering Disc Collector.
Patent Application,
J. M. Geary. Filed 21 Mar 80, 18p AD-D007 294/2
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A light-scattering disc collector member useable in converting a classical (coherence-dependent) microdensitometer to a linear (mode) microdensitometer that is coherence-independent. The member is made of material that is transmissive, non-absorbing, and high scattering as to light, and it preferably comprises a right circular cylinder which is made opaque (such as with black paint), except for a light-transmissive entrance aperture which is located on one base of the cylinder and which is shaped as an inwardly formed hemispherical dome, and a light-transmissive exit aperture which is located on the other base of the cylinder in geometric alignment with the entrance aperture. When used to convert a classical microdensitometer to a linear microdensitometer, the light-scattering disc collector member replaces the objective of the microscope in the sensor optics assembly of the classical microdensitometer.

PAT-APPL-6-134 358 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Laser Excited Molecular Beam Time and Frequency Standard.
Patent Application,
Clare C. Leiby, Jr. Filed 27 Mar 80, 21p AD-D007 293/4
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A laser excited molecular beam time and frequency standard utilizing a first electromagnetic beam at a first preselected frequency to excite a molecular beam at a first preselected point along the beam in order to produce fluorescence. A second electromagnetic beam (produced from either a different electromagnetic source than utilized to produce the first beam or produced from a portion of the first beam) at a second preselected frequency excites the molecular beam at a second preselected point along the beam to produce fluorescence. By locking the frequency of the first and second electromagnetic beams to specific resonant frequencies, a time and frequency standard can be produced. (Author)

PAT-APPL-6-144 465 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Minimum Resolvable Contrast Measurement Device for Video Systems.
Patent Application,
Harry L. Task. Filed 15 Apr 80, 12p AD-D007 285/0
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

This invention is directed to an apparatus for generating optical images having backgrounds of uniform and constant luminance with a nonperiodic, variable contrast pattern superimposed thereon. Two controllable intensity beams of uniform luminance are projected to a focus at the image plane. One of the beams contains a nonperiodic opaque pattern. Each beam passes through a linear polarizer, which polarizers are orthogonally oriented relative to each other. After beam splitting and interlacing, one of the two output beams formed is projected through a rotatable linear polarizer and onto an optical sensor at the image plane. The second split and interlaced beam is projected through a synchronized, rotatable linear polarizer, and then onto a detector assembly for measuring both background intensity and pattern contrast levels. Variations in the background intensity are sensed in the detector assembly, decoupled according to polarization and apportioned according to polarization as feedback signals to correct for drift in each of the two beam sources. Rotation of the polarizer in the optical path leading to the optical sensor changes the photometric luminance of the non-periodic pattern without altering the background luminance level.

PAT-APPL-6-145 210 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Langley Research Center, Langley Station, VA.
Metric Half-Span Model Support System.
Patent Application,
C. M. Jackson, Jr., S. M. Dollyhigh, and D. S. Shaw. Filed 30 Apr 80, 11p N80-24334/8, NASA-CASE-LAR-12441-1
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A model support system used to support a model in a wind tunnel test section is described. The model comprises a metric, or measured, half-span supported by a nonmetric, or nonmeasured, half-span which is connected to a sting support. Moments and forces acting on the metric half-span are measured without interference from the support system during a wind tunnel test.

PATENT-4 169 036 Not available NTIS
Department of Energy, Washington, DC.
System for Loading Slab-Gel Holders for Electrophoresis Separation.
Patent,

N. G. Anderson, and N. L. Anderson. Filed 24 Mar 78, patented 25 Sep 79, 6p PAT-APPL-889 691
Supersedes PAT-APPL-889 691-78.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A slab-gel loading system includes a prismatic chamber for filling a plurality of slab-gel holders simultaneously. Each slab-gel holder comprises a pair of spaced apart plates defining an intermediate volume for gel containment. The holders are vertically positioned in the chamber with their major surfaces parallel to the chamber end walls. A liquid inlet is provided at the corner between the bottom and a side wall of the chamber for distributing a polymerizable monomer solution or a coagulable colloidal solution into each of the holders. The chamber is rotatably supported so that filling can begin with the corner having the liquid inlet directed downwardly such that the solution is gently funneled upwardly, without mixing, along the diverging side and bottom surfaces. As filling proceeds, the chamber is gradually rotated to position the bottom wall in a horizontal mode. The liquid filling means includes a plastic envelope with a septum dividing it into two compartments for intermixing two solutions of different density and thereby providing a liquid flow having a density gradient. The resulting gels have a density gradient between opposite edges for subsequent use in electrophoresis separations. (ERA citation 05:024492)

PATENT-4 175 258
Not available NTIS
Department of Energy, Washington, DC.
High Level White Noise Generator.
Patent,
C. J. Borkowski, and T. V. Blalock. Filed 28 Jul 78, patented 20 Nov 79, 10p PAT-APPL-929 145
Supersedes PAT-APPL-929 145-78.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A wide band, stable, random noise source with a high and well-defined output power spectral density is provided which may be used for accurate calibration of Johnson Noise Power Thermometers (JNPT) and other applications requiring a stable, wide band, well-defined noise power spectral density. The noise source is based on the fact that the open-circuit thermal noise voltage of a feedback resistor, connecting the output to the input of a special inverting amplifier, is available at the amplifier output from an equivalent low output impedance caused by the feedback mechanism. The noise power spectral density level at the noise source output is equivalent to the density of the open-circuit thermal noise or a 100 ohm resistor at a temperature of approximately 64,000 Kelvins. The noise source has an output power spectral density that is flat to within 0.1% (0.0043 db) in the frequency range of from 1 KHz to 100 KHz which brackets typical passbands of the signal-processing channels of JNPT's. Two embodiments, one of higher accuracy that is suitable for use as a standards instrument and another that is particularly adapted for ambient temperature operation, are illustrated in this application. (ERA citation 05:022863)

PATENT-4 179 349
Not available NTIS
Department of Energy, Washington, DC.
Portable Probe to Measure Sensitization of Stainless Steel.
Patent,
J. Y. Park. Filed 26 Sep 78, patented 18 Dec 79, 4p PAT-APPL-945 924
Supersedes PAT-APPL-945 924-78.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An electrochemical cell is described for making field measurements of metals such as stainless steel. It consists of a cylinder containing a reservoir of an electrolyte, a reference electrode, a capillary tube connecting the electrolyte to the surface of the metal to be measured and another electrode in electrical contact with the electrolyte. External connections from the reference electrode, the other electrode, and the sample to a measuring device provide means for maintaining the potential of the electrolyte while sweeping the potential difference between the electrolyte and the metal. Such a sweep enables the determination of a current-voltage characteristic that is a measure of sensitization in the metal. (ERA citation 05:024417)

PATENT-4 193 029
Not available NTIS
Department of the Navy Washington DC
Pulsed Helium Magnetometer.
Patent,
Armand Cioccio, and Walter C. Folz. Filed 4 Mar 63, patented 11 Mar 80, 9p AD-D007 269/4, PAT-APPL-262 810
Supersedes PAT-APPL-262 810-63.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

The present invention relates to a low power helium magnetometer and more particularly to a pulsed helium magnetometer which will record a sample per second of diurnal and other variations of the earth's total magnetic field and will detect a change in the value of this field. In the field of magnetometers, one method of measuring magnetic fields has been to continuously excite cells of rubidium vapor mercury, or helium, by a UHF oscillator and to continuously detect and record variations in the output signal of the cell representative of changes in the surrounding magnetic field. These continuously excited magnetometers required for their operation a considerable amount of power and human effort, and their dynamic range was controlled by a number of fixed crystals. Vapor magnetometers, when operated. In the continuous mode, are limited to applications where a considerable amount of electric power is readily available, and since manual assistance is involved in their operation, this will automatically disqualify them for long-term unattended operation. In addition, the dynamic range of these magnetometers is limited to applications where background magnetic fields are known in advance.

PB80-198518 PC **A03**/MF **A01**
Midwest Research Inst., Kansas City, MO.
Source Emission Measurements of Volatile Organic Chemicals.
Final rept. Sep 78-Dec 79,
George W. Scheil, Fred J. Bergman, and Harold Owens. Jul 80, 48p EPA-600/2-80-166
Contract EPA-68-02-2977

Analytical methods for measuring volatile organic compounds were reviewed. Two commercially available instruments were selected and evaluated in the laboratory; one was judged unacceptable. The other analyzer was evaluated during a limited field test; results were satisfactory and averaged 3% higher than results produced by a concurrently operated gas chromatograph system.

PB80-199342 PC **A08**/MF **A01**
Recognition Systems, Inc., Van Nuys, CA.
Linewidth Measurement by Diffraction Pattern Analysis.
Final rept. Jan 75-Dec 76,
Harvey L. Kasdan. Apr 80, 159p NBS-GCR-79-175
Contract NBS-5-35890, ARPA Order-2397

Measurements on photomask linewidths of 1 to 10 micrometers are made using a technique of diffraction pattern analysis. This technique consists of Fourier analyzing the diffraction pattern produced by coherent light of wavelength 632.8 nm diffracting from a 1- to 10-micrometers wide photomask line. The technique is applied to both clear and opaque lines. Linewidth dimensions are obtained by numerical inversion of the measured Fourier diffraction spectrum to form the autocorrelation function and then statistically determining the x-axis intercept of this function. The effects of the variables of detector linearity, laser intensity variation and focusing on the measurement precision are investigated. The measurement linearity and repeatability are evaluated as functions of nominal linewidth dimensions, repeated focusing, and instrument aperture width for clear and opaque lines. The effects on the measured dimensions of a nonzero transmittance of the background for clear lines are calculated from theory.

PB80-808026 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Dynamometer Design and Use. 1970-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1970-Apr 80,
C. Gilbert Young. May 80, 212p
Sponsored in part by National Technical Information Service, Springfield, VA.

This collection of abstracts covers many applications of dynamometers. Some of these are in the biomedical, automotive, aerospace, marine, research, development and engineering areas. Also discussed is the design and construction of a variety of dynamometers, some employing novel approaches. (Contains 189 citations)

PB80-808934 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Dynamometer Design and Use. 1970-April, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1970-Apr 80,
C. Gilbert Young. May 80, 168p
Sponsored in part by National Technical Information Service, Springfield, VA.

This collection of abstracts covers many applications of dynamometers. Some of these are in the biomedical, automotive, aerospace, marine, research, development and engineering areas. Also discussed is the design and construction of a variety of dynamometers, some employing novel approaches. (Contains 144 citations)

PB80-808942 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Dynamometer Design and Use. 1972-April, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for 1972-Apr 80,
C. Gilbert Young. May 80, 67p
Sponsored in part by National Technical Information Service, Springfield, VA.

This collection of abstracts covers many applications of dynamometers. Some of these are in the biomedical, automotive, aerospace, marine, research, development and engineering areas. Also discussed is the design and construction of a variety of dynamometers, some employing novel approaches. (Contains 54 citations)

14E. Reprography

AD-A085 353/1 PC **A02**/MF **A01**
Purdue Univ Lafayette IN School of Civil Engineering
Mensuration Test using Digital Images,
John E. Unruh, and E. M. Mikhail. 1980, 12p
Contract DMA700-75-C-0119

Digital image files were written on photographic film using 25, 50, and 100 micrometer pixels. The resulting images were then measured monoscopically and stereoscopically. Measurement precisions associated with images having 25 and 50 micrometer pixel sizes were comparable. 100 micrometer pixel size had an adverse effect on measurement precision. (Author)

AD-A085 656/7 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Plasma X-Ray Sources for Lithography.
Technical note,
Nicholas P. Economou. 12 May 80, 18p TN-1980-17, ESD-TR-80-20
Contract F19628-80-C-0002, ARPA Order-3777

The X-ray source is an important part of any X-ray lithographic system since its characteristics affect ultimate resolution and throughput. High temperature plasmas can be intense X-ray emitters and may be suitable for lithography. This report defines some general considerations which are helpful in

evaluating various plasma sources. In addition, a brief analysis is given of three devices, or systems, used to produce such plasmas: the electron beam-sliding spark, the dense plasma focus and the laser produced plasma. (Author)

PATENT-4 205 124 Not available NTIS
Department of the Air Force Washington DC
Low Gamma Photographic Developer.
Patent,
Harvey A. Hodes. Filed 12 Jun 79, patented 27 May 80, 4p AD-D007 273/6, PAT-APPL-6-003 056
Supersedes PAT-APPL-6-003 056.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

This invention relates to A photographic developer composition containing Phenidone and hydroquinone in a 1 to 2 weight ratio, the composition having a gamma less than 1 and a pH in the range of about 9.8 to 10.4. The composition is particularly useful as an extended range developer for rapid processing of aerial film. (Author)

15. MILITARY SCIENCES

15C. Defense

AD-A085 158/4 PC **A06**/MF **A01**
Office of the Under Secretary of Defense for Research and Engineering Washington DC
Proceedings of the Particle Beam Research Workshop, Held at US Air Force Academy, Colorado, Springs, CO on 10-11 January 1980,
B. D. Guenther, Robert Lontz, John L. May, and C. Martin Stickley. May 80, 104p

The particle beam research workshop was jointly organized by the Army Research Office (ARO) and the Air Force Office of Scientific Research (AFOSR) to develop a forum for the discussion of unclassified research issues relevant to particle beam weapons technology. It was an additional objective to develop a document which could be used as an unclassified guide for scientists who are interested in this technology but have not had prior access to the classified efforts. Finally, the workshop and the guide are designed to provide an information resource for DoD managers concerned with the opportunities that unclassified research offer to this technology.

PATENT-4 194 194 Not available NTIS
Department of the Navy Washington DC
Piezoelectric Vibration Detector for Sensing a Nearby Intruder.
Patent,
John T. Redfern. Filed 30 Jan 78, patented 18 Mar 80, 4p AD-D007 266/0, PAT-APPL-873 200
Supersedes PAT-APPL-873 200-78, AD-D005 297.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An intrusion sensor uses thin film piezoelectric transducers to sense nearby mechanical vibrations. A hose-like sheath contains a pair of insulating strips which carry conductive leaves on their outer surfaces. A series of longitudinally arranged segments of a thin film piezoelectric material are coupled to the leaves to provide signals representative of impinging mechanical vibrations. Since adjacent ones of the thin film segments are alternately polarized, signals are created only when the vibrations are nearby. Greater sensitivity to nearby vibrations is assured when each of the segments is fabricated from several layers of the thin film piezoelectric material. (Author)

PATENT-4 197 529 Not available NTIS
Department of the Navy Washington DC
Intrusion Detection Apparatus.
Patent,
Clarence F. Ramstedt, and Tibor G. Horwath. Filed 17 Feb 78, patented 8 Apr 80, 6p AD-D007 261/1, PAT-APPL-878 560
Supersedes PAT-APPL-878 560-78.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A specially configured cable, which, in use, has a cross section which is symmetrical to a vertical line, but asymmetrical to a horizontal line, is used for an intrusion detection system. It comprises an external sheath, which may be round or rectangular in cross section. An inner conductor is positioned below the center of the cable. It is supported in place by a thin, substantially flat, sheet of insulating material, which is attached to the inner surface of the outer sheath. This particular configuration maximizes the change in capacitance caused by an intruder passing over the cable. The cable is connected to a time-domain reflectometer, which can display on a screen the location of the intrusion with respect to an end of the cable as well as the probable type of intrusion. (Author)

15E. Logistics

AD-A085 346/5 PC **A04**/MF **A01**
Office of the Under Secretary of Defense for Research and Engineering Washington Dc
Defense Computer Resources Technology Plan.
Jun 79, 70p
See also AD-A047 062 and AD-A022 558.

This is the second edition of the plan; it was prepared with the full cooperation of the three Services, DARPA, DCA, and NSA. Its revised outline provides a more coherent and meaningful grouping of efforts, clarifies the intent of some subdivisions, and adds new categories. The scope has been expanded to include hardware technology needs. All parts of the text have been considerably expanded to provide more comprehensive descriptions of problems, issues, and R&D directions. In each R&D area, specific DARPA, Service, and OSD initiatives are identified. In some areas efforts are building up and becoming better focused, but in others present budgets are inadequate to allow meaningful efforts to be started. Examples of developed areas are support for standard high order languages, high order language modernization and convergence (Ada), distributed systems technology, and the development of standard militarized computers. Key areas in which deficiencies still exist include multilevel computer security, error-resistant systems, standardization of input/output and network interfaces, and specification of standard reusable software functions.

AD-A085 395/2 PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD
Afloat Information and Material Movement Study (AIMMS). Phase 2. Data Acquisition.
Interim rept.,
Benjamin Siegel, and Curtis Ash. May 80, 38p
Rept no. DTNSRDC-80/075

The purpose of the Afloat Information and Material Movement Study (AIMMS) is to determine the relative locations (measured in time), equipment and manning requirements (configuration), of a new construction aircraft carrier supply support system that will maximize the effectiveness of the system during at-sea operations. The prime objective of the study is to develop a method that can be used as a tool for analyzing the effects on the system of adjusting the characteristics of the configuration. This Phase 2 report describes: (1) the data acquired to quantify the required supply support processes, (2) the measure of effectiveness to be used as a basis for evaluations, and (3) the potential systems that may be considered as substitutes for current inter- and intra-process means of information and material processing and transfer.

AD-A085 566/8 PC **A05**/MF **A01**
Army Military Personnel Center Alexandria VA
The Decline of U.S. Sea Power: An Empirical Study.
Master's thesis,
Nelson E. Modrall. 21 May 80, 76p

Since the close of World War II, the United States has become increasingly dependent upon sea borne commerce. At the same time, the American political processes have permitted the U.S. capabilities governing the transportation and defense of this trade to decline. Given the plausible ramifications of these observations, on the international status quo, an investigation of several hypotheses was conducted to determine scientifically the status of United States sea power. Each hypothesis was subjected to the same manipulation with parametric statistics to determine the association between variables, and the strength and significance of these relationships. The findings, overall, demonstrated support for the notion that a strong and meaningful correlation exists between the variables as stated above. In turn, this scientific evidence was used to support the conclusion that United States sea power is in a state of decline. (Author)

15F. Nuclear Warfare

AD-A085 634/4 PC **A04**/MF **A01**
Command and Control Technical Center Washington DC
The CCTC Quick-Reacting General War Gaming System (QUICK) Users Manual. Volume III. Weapon Allocation Subsystem. Change 2.
30 Apr 80, 56p Rept no. CCTC-CSM-UM-9-77-V3-CH-2
Change 2 to Rept. no. CCTC-CSM-UM-9-77-VOL-3, AD-A055 848. See also Change 1, AD-A070 787.

The computerized Quick-Reacting General War Gaming System (QUICK) will accept input data, automatically generate global strategic nuclear war plans, provide output summaries, and produce input tapes to simulator subsystems external to QUICK. QUICK has been programmed in FORTRAN for use on the CCTC HIS 6000 computer system. The QUICK Users Manual consists of four volumes: Volume I, Data Management Subsystem; Volume II, Weapon/Target Identification Subsystem; Volume III, Weapon Allocation Subsystem; Volume IV, Sortie Generation Subsystem. The Users Manual complements the other QUICK Computer System Manuals to facilitate application of the war gaming system. This volume, Volume III, provides detailed instructions for execution of the Weapon Allocation Subsystem and the modules it comprises. (Author)

AD-A085 635/1 PC **A09**/MF **A01**
Command and Control Technical Center Washington DC
The CCTC Quick-Reacting General War Gaming System (QUICK). Volume IV. Sortie Generation Subsystem. Parts I and II. Program Maintenance Manual. Change 2.
3 Jun 80, 187p Rept no. CCTC-CSM-MM-9-77-V4-CH-2
Change 2 to Volume 4, Part 1, AD-A058 436 and Part 2, AD-A058 406. See also Change 1, AD-A071 759.

This volume of the QUICK Program Maintenance Manual describes the modules which are part of the QUICK Sortie Generation Subsystem. The information contained herein is presented on a module-by-module basis, complemented with discussions on computer programming maintenance on a subject-by-subject basis. The module-by-module discussions are structured so that a maintenance programmer can understand the program functions and programming techniques. The computer subjects are structured to inform the maintenance programmer of overall system programming techniques and conventions. (Author)

AD-A085 636/9 PC **A03**/MF **A01**
Command and Control Technical Center Washington DC
The CCTC Quick-Reacting General War Gaming System (QUICK). Users Manual. Volume II. Weapon/Target Identification Subsystem. Change 3,
Dale J. Sanders, Paul F. M. Maykrantz, Jim M. Herrin, and Edward F. Bersson. 1 Jun 77, 41p
Rept no. CCTC-CSM-UM-9-77-vol-2-ch-3
Change 3 to report dated 1 Jun 77, AD-A046 088. See also Change 2, AD-A071 031.

The computerized Quick-Reacting General War Gaming System (QUICK) will accept input data, automatically generate global strategic nuclear

war plans, provide output summaries, and produce input tapes to simulator subsystems external to QUICK. QUICK has been programmed in FORTRAN for use on the CCTC HIS 6000 computer system. The QUICK Users Manual consists of four volumes: Volume I, Data Management Subsystem; Volume II, Weapon/Target Identification Subsystem; Volume III, Weapon Allocation Subsystem; Volume IV, Sortie Generation Subsystem. The Users Manual complements the other QUICK Computer System Manuals to facilitate application of the war gaming system. This volume, Volume II, provides detailed instructions for execution of the Weapon/Target Identification subsystem and the modules it comprises.

15G. Operations, Strategy, and Tactics

AD-A085 711/0 PC **A05**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Engineering
Quantization Error due to Signature Table Evaluations.
Master's thesis,
David Scott Prahler. Mar 80, 80p Rept no. AFIT/GST/EE/80-1

The signature tables used in TAC ASSESSOR were assumed to be representations of some corresponding value functions evaluated at certain levels of the input features. The theoretical mean-squared-error due to this substitution was calculated for signature table 1 and table 5 in the FAC Target Importance Tables. The calculations were performed under two different assumption concerning the assumed value functions. Case 1 was that the signature table values resulted from evaluating the assumed value function at the given input feature values. Case 2 was that the function was evaluated at some feature values in the given quantization level indicated by the input feature. Next, an evaluation simulation was performed on three sets of 30 targets whose features were generated using uniform, exponential, and normal random variate generators scaled to the appropriate feature limits. Finally, the Spearman rank correlation coefficient was used to test the null hypothesis that there was no association between the evaluation methods.

16. MISSILE TECHNOLOGY

16A. Missile Launching and Ground Support

AD-A085 576/7 PC **A05**/MF **A01**
Physics International Co San Leandro CA
Calculations of SRI International MX Trench Expansion and Venting Experiments.
Final rept. 18 Jul-31 Dec 77,
D. L. Orphal, M. S. Chawla, and K. R. Abbott. 1 Mar 78, 78p PIFR-1102-1, DNA-4498F, AD-E300 791
Contract DNA001-77-C-0299

Three calculations were performed corresponding to Tests 11, 17 and 18 of the SRI International 'Laboratory Investigations of the Expansion and Venting of the MX Trench' program. Based on analyses of the SRI International experimental data and the results of several preliminary calculations (not reported here), a new model for trench venting was developed. The new venting model is based on simple jet penetration theory. The theoretical results show good overall agreement with the experimental data. In particular, the in-trench pressure histories and trench expansion results for the Test 18 calculation, incorporating the new venting model, agree well with the experimental data. Although further calculations and analyses are required to investigate the applicability and limitations of the venting model, the good agreement between the theoretical and experimental results for Test 18 is encouraging.

AD-A085 580/9 PC **A03**/MF **A01**
Science Applications Inc El Segundo CA
Airblast Experiments for the M-X Spur.
Final rept. 5 Jul 77-31 Dec 78,
James E. Craig. 31 Dec 78, 49p SAI-79-569-LA, DNA-4721F, AD-E300 790
Contract DNA001-77-C-0280

A series of experiments was performed in the NASA Ames Electric Arc Shock Tube to investigate the propagation of strong waves (p approximately 40 BARS) in a model of the M-X Spur. The experiments were designed to measure incident and reflected shock pressures to provide a basis for the development of computer models for analysis of blast wave propagation in the M-X Spur. Since the M-X Spur is an asymmetric design, separate experiments were performed for flow by the Spur and flow into the Spur. Initial and reflected shock pressures were recorded at several key locations in the model. The pressure loading on the model blast door was nonuniform along the door and was similar for loading from either direction. The maximum pressure on the blast door (P approximately 80 BARS) occurred at the narrow portion of the Spur. The highest pressures in the model (P approximately 130 BARS) occurred on the end of the turnout for flow into the Spur. Two dimensional flowfield calculations were performed by TRW and Systems, Science and Software for flowfields related to the present tests. Favorable comparisons with measurements were obtained for flow by the Spur. Calculations for flow into the Spur did not compare well with the test data demonstrating the effect of late time flows for this orientation.

16C. Missile Warheads and Fuses

AD-A085 457/0 PC **A03**/MF **A01**
Aerospace Corp El Segundo CA Lab Operations
Lift-Dispersion Control of Spinning Reentry Vehicles.
Interim rept.,
D. H. Platus. 10 Apr 80, 41p TR-0080(5940-02)-1, SD-TR-80-22
Contract F04701-79-C-0080

A control system is described that will limit cross-range dispersion of spinning reentry vehicles caused by lift variations. The controls consist of small trim flaps or reaction jets that utilize information derived from strapdown motion sensors to minimize lift nonaveraging. Because epicyclic oscillations in angle of attack do not cause dispersion, only the phasing of complex angle-of-attack motion must be controlled to minimize the net transverse velocity that would otherwise result from lift variations. This requires relatively little control energy compared with a system that would trim the vehicle at zero angle of attack. A simple control law is derived that specifies minimum feedbacks required, and the open- and closed-loop vehicle response to impulsive disturbance moments is demonstrated. (Author)

16D. Missiles

AD-A085 773/0 PC **A10**/MF **A01**
Army Materiel Systems Analysis Activity Aberdeen Proving Ground MD
Simulation & Analysis of the Training Effectiveness Analysis-TOW (TEA-TOW) Flight Data.
Technical rept.,
Patrick E. Corcoran. Apr 80, 201p Rept no. AMSAA-TR-293

AMSAA was requested to provide an independent third party analysis of TRADOC's Training Effectiveness Analysis-TOW (TEA-TOW) live firing data when neither the tester nor the TOW Program Manager'S Office agreed on the cause of the large missile excursions and reduced frequency of hit. By making use of the AMSAA TOW missile simulation it is concluded that the missile excursions were the result of gunner tracking errors in all but one case. The excursions in flight 2407 are not the result of gunner tracking error. In addition, these flight data are compared with the simulated trajectories to demonstrate that the AMSAA TOW missile simulation is a valid representation of the real system especially when engaging the accelerating target. (Author)

SAND-79-1247 PC **A03**/MF **A01**
Sandia National Labs., Albuquerque, NM.
Extended Range Bomb Autopilot Development Report.
J. R. Phelan. Mar 80, 45p
Contract EY-76-C-04-0789

A digital autopilot is described which was developed for use in the Extended Range Bomb (ERB) program. This autopilot can fly the vehicle in either a standoff trajectory or a return-to-target (RTT) trajectory. (ERA citation 05:022777)

17. NAVIGATION, DETECTION, COMMUNICATIONS, AND COUNTERMEASURES

17A. Acoustic Detection

AD-A085 088/3 PC **A02**/MF **A01**
Naval Ocean Systems Center San Diego CA
The Grid- A Possible Result of the Application of Fiber Optics to Undersea Surveillance: Some Potentials and the Concept.
Technical document,
F. P. Armogida. Mar 80, 13p Rept no. NOSC/TD-332

The grid concept is a proposal to stimulate thinking on the 'wet end revolution'. Details of a grid for global undersea surveillance and its component parts are delineated. The concept description is prefaced by a brief review of the state of fiber optic technology. (Author)

AD-A085 393/7 MF **A01**
Naval Ocean Systems Center San Diego CA
Composite-Unit Accelerated Life Testing (CUALT) of Sonar Transducers.
Final rept. Mar 78-Sep 79,
D. L. Carson. Sep 79, 162p Rept no. NOSC/TR-516
Original contains color plates: All DTIC and NTIS reproductions will be in black and white.
Availability: Microfiche copies only.

NOSC was assigned to develop standardized methods to accelerate the aging of transducers to provide experimental methods for early discovery of problems that would detrimentally affect their reliability and useful life cycle. A secondary accomplishment was directed to aid in the development of selected transducers currently being procured. Both projector and receiver types were included in the effort to perfect the accelerated life testing (ALT) methods. (Author)

AD-A085 671/6 PC **A04**/MF **A01**
Analytic Sciences Corp Reading MA
Performance Lower Bounds for Compensated Tracking Sensors.
Interim technical rept. Sep 78-Feb 80,
Jorge I. Galdos, and T. Sen Lee. 28 Feb 80, 61p Rept no. TASC-TR-1519-1
Contract N00014-78-C-0684

The process of tracking and localization of a moving acoustic source in the ocean has a natural formulation as a problem in nonlinear filtering theory. In general, the optimal estimator for this signal processing problem cannot be explicitly constructed nor can optimal performance be computed. However, optimal performance can be approximated by using mathematical algorithms which provide lower bounds on attainable estimation accuracy. Lower bounds on tracking and localization errors are especially useful in that they indicate system performance limits and can be computed from basic measurement scenario parameters without reference to specific estimator structure. This report describes the mathematical structure and software required to compute non-linear filtering lower bounds to the tracking and localization performance attainable with a towed linear acoustic array and a hull-mounted sonar. The state-space model for the acoustic environment and sensor measurement processes used by the lower bound algorithms is also described. Range and bearing estimation performance as a function of signal-to-noise ratio, array distortion, and other important parameters, is studied for a generic measurement scenario. (Author)

PAT-APPL-6-109 940 PC **A02**/MF **A01**
Department of the Navy Washington DC
Miniaturized Scan within a Pulse Sonar.
Patent Application,

Jack E. Holzschu. Filed 1 Apr 80, 24p AD-D007 228/0
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

An improvement for a sonar is provided wherein the improvement includes a line array of N listing transducer elements, each listening element being capable of receiving an acoustic signal and outputting a corresponding electrical signal. A plurality of beamformers is provided wherein each beamformer has an input and an output, the input of each beamformer receiving the output from each listening element. A switching device is interconnected between the listening elements and the beamformers for alternately switching the outputs of the listening elements to each beamformer between two modes, one mode being a predetermined order and the other mode being an iversion of the predetermined order. With this arrangement only half the normal number of beamformers is required , thereby significantly reducing the weight and size of the sonar.

PATENT-4 190 818 Not available NTIS
Department of the Navy Washington DC
Digital Beamsteering for a Parametric Scanning Sonar System.
Patent,
James W. Follin, and Robert E. Miller. Filed 25 Aug 77, patented 26 Feb 80, 18p AD-D007 272/8, PAT-APPL-827 652
Supersedes PAT-APPL-827 652-77.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

Digital beamsteering for a parametric scanning sonar steers a nonlinear, modulated signal of a single high frequency by appropriately delaying and/or varying the phase of the signal as it enters each of a plurality of elements in an array. The sonar beam can be steered electronically over a wide range of angles. (Author)

PATENT-4 193 129 Not available NTIS
Department of the Navy Washington DC
Charging Circuit for Sonar Systems.
Patent,
Robert W. Wiggins, Kurt L. Ettenhofer, and Jack Bess. Filed 2 Jan 76, patented 11 Mar 80, 7p AD-D007 249/6, PAT-APPL-645 868
Supersedes PAT-APPL-645 868-76, AD-D006 934.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A charging circuit for a helicopter dipped sonar system in which a single cable conducts sonar and command signals in either direction along with a DC charging current from the helicopter to a storage battery in a submersible sensor unit. A multiplexer and power supply in the helicopter respectively provide simultaneous transmission of command data and charging current over a common conductor to the sensor unit. A filter and demultiplexer positioned in the sensor unit passes only the data for control of a sonar transmitter. The storage battery is charged directly from the conductor and a battery charge indication as well as hydrophone information is combined by a multiplexer at the sensor and returned to the helicopter by the common conductor for data display and power supply control.

17B. Communication

AD-A084 682/0 PC **A05/MF A01**
Spectronics Inc Richardson TX
Low Cost Fiber Optic Module Development Program.
Final rept. Aug 78-Sep 79,
Ben R. Elmer, and Gary R. Mangus. Dec 79, 77p AFAL-TR-79-1216
Contract F33615-78-C-1490

This document is the final report of a development program to design, fabricate, test, and deliver approximately 50 sets of transmitter and receiver modules to transmit data via fiber optic bundles at data rates of 10KB/s to 10MB/s. The modules' inherent characteristics are displayed using block diagrams with each important element of the diagram described. The design, testing, test results, and assembly of the modules are included. Also included are the application sections written to inform users of the characteristics of the modules. (Author)

AD-A085 161/6 PC **A04/MF A01**
Atlantic Research Corp Alexandria VA
Communications-Electronic Intrasystem Electromagnetic Interference Measurement Techniques and Instrumentation.
Quarterly rept. no. 3, 21 Dec 79-20 Mar 80,
Lester E. Polisky, and John Savage. May 80, 73p CORADCOM-79-0786-3
Contract DAAK80-79-C-0786

This report presents the results obtained during the third quarter of the Communications-Electronics Intrasystem Electromagnetic Interference Measurement Techniques and Instrumentation Project. The period covered was 21 Dec. 1979 to 20 March 1980. The major effort in the third quarter consisted of completing the broadband measurement technique description and initiating the evaluation of MIL-STD-461A techniques. (Author)

AD-A085 306/9 PC **A08/MF A01**
Naval Ocean Systems Center San Diego CA
Naval Outgoing Message Processing, A Study of Message Generation and Message Preparation for Transmission and the Impact of Automation.
Final rept. Mar-Aug 78.
Dec 79, 165p Rept no. NOSC/TR-475

This study documents some of the means and methods available to remedy the message preparation and entry problem of afloat ships and lists, with prices, for the available component terminal equipments. It proposes a modular concept that can stand alone or be integrated with any of the appropriate NAVMAC systems. It also provides guidelines for SURFPAC to evaluate various means of message entry and message processing with their associate costs. (Author)

AD-A085 320/0 PC **A11/MF A01**
Haskins Labs Inc New Haven CT
Speech Research, A Report on the Status and Progress of Studies on the Nature of Speech, Instrumentation for Its Investigation, and Practical Applications.
Status rept. 1 Jan-31 Mar 80,
Alvin M. Liberman, Arthur S. Abranson, Thomas Baer, Catherine Best, and Guy Carden. 31 Mar 80, 231p Rept no. SR61(1980)
Grants PHS-HD-01994, PHS-HD-2420
Sponsored in part by Grants NSF-BNS76-82023, NSF-MCS79-16177, NSF-BNS78-27331, PHS-NS-13870, PHS-NS-13617 and PHS-AM-25814.

This report is one of a regular series on the status and progress of studies on the nature of speech, instrumentation for its investigation, and practical applications. Manuscripts cover the following topics: Acoustics in Human Communication: Evolving Ideas About the Nature of Speech; Motor-Sensory Feedback Formulations: Are We Asking the Right Questions; Phonetic Representation and Speech Synthesis by Rule; Relationships Between Speech Perception and Speech Production in Normal Hearing and Hearing-Impaired Subjects; Accessibility of the Voicing Distinction for Learning Phonological Rules; Influence of Vocalic Context on Perception of the (sh) - (s) phonetic Distinction: II. Spectral Factors; Exploring a Vibratory Systems Analysis of Human Movement Production; Properties of Slowly Adapting Joint Receptors Do Not Readily Predict Perception of Limb Position; Perceiving Phonetic Segments; Reading, Linguistic Awareness and Language Acquisition; A Range-Frequency Effect on Perception of Silence in Speech; Perception of Stop Consonants before Low Unrounded Vowels; Toward a Theory of Apractic Syndromes; Comparison of Parametric Representations for Monosyllabic Word Recognition in Continuously Spoken Sentences. (Author)

AD-A085 399/4 PC **A05/MF A01**
Naval Ocean Systems Center San Diego CA
Ionospheric Profiles for Predicting Nighttime VLF/LF Propagation, Determination of an Effective (Exponential) Model for Use in Design and Deployment of Resources for Communication and Navigation.
Final rept. Jan 74-Sep 79
J. A. Ferguson. 25 Feb 80, 81p Rept no. NOSC/TR-530

The regression analysis of ionospheric profiles from the literature fails to show the high ionospheric variability that is observed in the propagation measurements. Neither does it show the rapid transition in altitude between high and middle latitudes. The measured propagation data are more directly related to the MEECN and Omega system requirements for predicting vlf and lf field strengths. Profiles are suggested on the basis of the analysis of these data. (Author)

AD-A085 421/6 PC **A02/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Limits on Time Synchronization Accuracy.
Journal article,
Patrick R. Hirschler. 1979, 6p MS-5168, ESD-TR-79-352
Contract F19628-80-C-0002
Pub. in National Telecommunications Conference, p33.1.1-33.1.5 Nov 79.

No abstract available.

AD-A085 425/7 PC **A02/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
EHF Satellite Communications Systems for Mobile Users.
Journal article,
Reuben E. Eaves. 1979, 7p MS-5025, ESD-TR-79-341
Contract F19628-80-C-0002
Pub. in EASCOM 1979 Record, p630-636 1979.

No abstract available.

AD-A085 426/5 PC **A02/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Some Factors that Influence EHF SATCOM Systems.
Journal article,
Leon J. Ricardi. 1979, 7p MS-4937A, ESD-TR-79-340
Contract F19628-80-C-0002
Pub. in EASCON 1979 Record, p617-622 Oct 79.

No abstract available.

AD-A085 427/3 PC **A02/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
A Local Access Network for Packetized Digital Voice Communication.
Journal article,
Don H. Johnson, and Gerald C. O'Leary. 1979, 6p MS-5086, ESD-TR-79-344
Contract F19628-80-C-0002, ARPA Order-2006
Pub. in Proceedings of the National Telecommunications Conference, p13.4.1-13.4.5 Nov 79.

No abstract available.

AD-A085 428/1 PC **A02/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Coding for the Turbulent Atmospheric Optical Channel.
Journal article,
Vincent W. S. Chan. 1979, 6p MS-5088, ESD-TR-79-345
Contract F19628-80-C-0002
Pub. in Proceedings of the National Telecommunications Conference, p44.3.1-44.3.5 Nov 79.

No abstract available.

AD-A085 434/9 PC **A02/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Reduction of Quantization Noise in Pulse Code Modulation (PCM) Image Coding.
Journal article,
Jae S. Lim. 1979, 10p MS-5126, ESD-TR-79-349
Contract F19628-80-C-0002
Pub. in SPIE, v207 p314-322 1979.

No abstract available.

AD-A085 459/6 PC **A02/MF A01**
Bolt Beranek and Newman Inc Cambridge MA

TAC Functional Specification.
Quarterly technical rept. 1 Mar-31 May 80,
R. Hinden. Jun 80, 16p Rept no. BBN-4401
Contract MDA903-80-C-0353, DARPA Order-3214

The Terminal Access Controller (TAC) is a terminal controller for the ARPANET. The present document describes what the TAC does, what it does not do, and what its relationship is to the network. (Author)

AD-A085 499/2 PC **A02/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
The Tradeoff between Delay and TASI Advantage in a Packetized Speech Multiplexer.
Journal article,
Clifford J. Weinstein, and Edward M. Hofstetter.
2 Mar 79, 6p JA-4928, ESD-TR-79-356
Contract F19628-80-C-0002
Pub. in IEEE Transactions on Communications, vCOM-27 n11 p1716-1720 Nov 79.

No abstract available.

AD-A085 507/2 PC **A04/MF A01**
Illinois Univ At Urbana-Champaign Coordinated Science Lab
A Numerical Study of Two Measures of Delay for Network Routing.
Master's thesis,
Kenneth Steven Vastola. Sep 79, 64p Rept nos. R-859, UILU-ENG-78-2252
Contracts DAAG29-78-C-0016, N00014-79-C-0424
Sponsored in part by grant NSF-ENG77-15947.

This work presents computational results relating to the solution of convex multicommodity network flow problems by using an algorithm developed by D. P. Bertsekas from the ideas of Gallagher's method for distributed optimization of delay in data communication networks and gradient projection ideas from nonlinear programming. This algorithm is described and results are given for two measures of 'delay' in the network. In the first case, the formula for delay was based on the expression for queuing delay in M/M/1 queues suggested by Kleinrock. Here several versions of the algorithm (including with and without line search) are discussed. In the second case, the algorithm is applied to the dual problem in an approximation scheme based on a method of multipliers with exponential penalty function due to Kort and Bertsekas. Here the measure of delay being minimized is the largest link utilization in the network. Finally the two measures of delay are compared. In the examples we find that a fairly good solution to each of the problems may be found near the optimal point for the other problem.

AD-A085 577/5 PC **A06/MF A01**
JAYCOR Del Mar CA
Aspects of Late-Time Striation Behavior and Satellite Communication Effects.
Final rept. 22 Dec 76-31 Jan 79,
S. Robert Goldman, and Jacob L. Sperling. 1 Feb 79, 121p J78-2005-TR, DNA-4923F, AD-E300 793
Contract DNA001-76-C-0186

This report is a study of aspects of plasma wave turbulence relevant to late-time striation behavior and satellite communication effects. These include: 1. Basic theory of particle diffusion due to quasi-neutral plasma modes. 2. Forms for the diffusion coefficients of linear and nonlinear mode properties. 3. Relevance to E x B gradient-drift modes in the absence of other modes. 4. Diffusion due to drift-dissipative turbulence. 5. Characterization of the diffusion coefficient from drift-dissipative modes in computer simulations. 6. Observational aspects of drift-dissipative waves relevant to in-situ measurement and scintillation. 7. Discussion of some selected experimental situations and phenomena such as the BUARO release, STRESS, and Three-Meter Backscatter. 8. Survey of additional density-gradient instabilities possibly relevant to anomalous diffusion under HANE conditions. The study suggests that modes other than the E x B mode can contribute to striation dynamics at high altitudes. Possible experimental tests of the relationship of plasma turbulence and striation evolution are described.

AD-A085 579/1 PC **A04/MF A01**
SRI International Menlo Park CA
Binary Error Rates for a Two-Component Scintillation Channel.
Topical rept. 1 Jan-31 Aug 79,
Steven C. Johnson, and Charles L. Rino. 31 Aug 79, 51p DNA-5071T, AD-E300 786
Contract DNA001-77-C-0038

This report describes a procedure for calculating the bit error rates for binary transmission through a two-component multiplicative channel of the type that has been proposed to represent the transionospheric channel. This procedure is then used to calculate the probability of error for several cases of interest that are not represented by commonly used Gaussian models. The non-Rician/Raleigh channel primarily affects the phase of the signal. Thus, the major impact is on coherent systems in a fast-fading environment. In all cases, however, the effects of non-Rician and non-Gaussian fading are small when compared with a Rician or Gaussian channel with comparable fading levels.

AD-A085 590/8 PC **A03/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Performance of Multiple Satellite Systems with Common Downlink Frequency Hopping Patterns.
Technical note,
Jeannine Mosely. 29 Feb 80, 31p TN-1980-14, ESD-TR-80-18
Contract F19628-80-C-0002

This report considers a situation in which more than one satellite transmitting frequency-hopped signal is in view of a given terminal. If it is desired that the satellites use the same frequency hopping pattern for ease of acquisition and handover, then a receiver which is in range of more than one satellite may encounter interference. This interference is analyzed for a generalized system of two satellites modelled after the LES-8/9 system. Upperbounds for the probability of error are derived for receivers using a square-law combining rule. This expression is evaluated for the LES-8/9 system, using two different downlink codes. It is seen that the choice of code makes a significant difference in system performance, and that with a suitably chosen code, two satellites may use the same frequency hopping pattern without significant performance degradation. (Author)

AD-A085 667/4 PC **A03/MF A01**
Utah Univ Salt Lake City Dept of Computer Science
Noise Suppression Methods for Robust Speech Processing.
Semi-annual technical rept. 1 Oct 79-31 Mar 80,
Steven F. Boll, H. Ravindra, G. Randall, R. Armantrout, and R. Power. May 80, 38p Rept no. UTEC-CSC-80-058
Contract N00173-79-C-0045, ARPA Order-3301

Robust speech processing in practical operating environments requires effective environment and processor noise suppression. This report describes the technical findings and accomplishment during this reporting period for the research program funded to develop real-time, compressed speech analysis-synthesis algorithms whose performance in invariant under signal contamination. Fulfillment of this requirement is necessary to insure reliable secure compressed speech transmission within realistic military command and control environments. Overall contributions resulting from this research program include the understanding of how environmental noise degrades narrow band, coded speech, development of speech parameter identification methods that consider signal contamination as a fundamental element in the estimation process. This report describes the current research and results in the areas of noise suppression using the dual input adaptive noise cancellation using the Short-time Fourier Transform algorithms, articulation rate change techniques, and a description of an experiment which demonstrated that the spectral subtraction noise suppression algorithm can improve the intelligibility of 2400 bps, LPC-10 coded, helicopter speech by 10.6 points. (Author)

AD-A085 759/9 PC **A12/MF A01**
Kaman AviDyne Burlington MA
Structural Modeling and Response of Command, Control and Communication Shelter Systems for Event DICE THROW.
Final rept. 26 Jul 77-1 Mar 78,
John M. Calligeros, John P. Walsh, and Raffi P. Yeghiayan. Mar 80, 272p KA-TR-151, ARBRL-CR-00421, AD-E430 442
Contract DAAD05-74-C-0744

Structural finite element models of the Army command, control, and communication systems AN/TRC-117, AN/TRC-110, AN/TCC-61 which utilizes the S-280 shelter, and the AN/TRC-145 and AN/GRC-142B, which utilize the S-250 shelter, were developed for NASTRAN. Loading models and dynamic response for overpressure levels experienced in the recent DICE THROW field test were determined for all but the AN/GRC-142B. Comparisons between measured and analytical accelerations are given for the AN/TRC-117 and the AN/TRC-145 at an incident overpressure level of 41.4 kPa. The comparisons were generally poor for the AN/TRC-117 but much more favorable for the AN/TRC-145.

AD-A085 792/0 PC **A02/MF A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Enhancement and Bandwidth Compression of Noisy Speech.
Journal article,
Jae S. Lim, and Alan V. Oppenheim. 22 Jun 79, 20p JA-4994, ESD-TR-80-9
Contracts F19628-80-C-0002, N00014-75-C-0951
Pub. in Proceedings of the IEEE, v67 n12 p1586-1604 Dec 79.

No abstract available.

AD-A085 807/6 PC **A03/MF A01**
Bolt Beranek and Newman Inc Cambridge MA
Combined Quarterly Technical Report Number 17. SATNET Development and Operation Pluribus Satellite IMP Development Remote Site Maintenance Internet Development Mobile Access Terminal Network.
Rept. for 1 Feb-30 Apr 80,
R. D. Bressler. May 80, 42p Rept no. BBN-4399
Contracts MDA903-76-C-0252, N00039-78-C-0405
Sponsored in part by Contracts N00039-79-C-0386 and MDA903-80-C-0353. Continuation of Contracts DAHC15-69-C-0179, F08606-73-C-0027, F08606-75-C-0032 and MDA903-76-C-0213.

This Quarterly Technical Report describes work on the development of and experimentation with packet broadcast by satellite; on development of Pluribus Satellite IMP; on a study of the technology of Remote Site Maintenance; on the development of Internetwork monitoring; and on shipboard satellite communications. (Author)

N80-25357/8 PC **A16/MF A01**
General Electric Co., Philadelphia, PA. Space Div.
Study of Advanced Communications Satellite Systems Based on SS-FDMA.
J. Kiesling. May 80, 359p NASA-CR-159778, DOC-80SDS4217
Contract NAS3-21745

A satellite communication system based on the use of a multiple, contiguous beam satellite antenna and frequency division multiple access (FDMA) is studied. Emphasis is on the evaluation of the feasibility of SS (satellite switching) FDMA technology, particularly the multiple, contiguous beam antenna, the onboard switch and channelization, and on methods to overcome the effects of severe Ka band fading caused by precipitation. This technology is evaluated and plans for technology development and evaluation are given. The application of SS-FDMA to domestic satellite communications is also evaluated. Due to the potentially low cost Earth stations, SS-FDMA is particularly attractive for thin route applications up to several hundred kilobits per second, and offers the potential for competing with terrestrial facilities at low data rates and over short routes. The onboard switch also provides added route flexibility for heavy route systems. The key beneficial SS-FDMA strategy is to simplify and thus reduce the cost of the direct access Earth station at the expense of increased satellite complexity.

N80-25358/6 PC **A12/MF A01**
Aerospace Corp., Los Angeles, CA.
Communication Satellite Technology: State of the Art and Development Opportunities.
J. B. Woodford. Jul 78, 275p NASA-CR-159977, ATR-78(7735)-1

Contract NAS5-24489

Opportunities in communication satellite technology are identified and defined. Factors that tend to limit the ready availability of satellite communication to an increasingly wide group of users are evaluated. Current primary limitations on this wide utilization are the availability of frequency and/or synchronous equatorial satellite positions and the cost of individual user Earth terminals. The former could be ameliorated through the reuse of frequencies, the use of higher frequency bands, and the reduction of antenna side lobes. The latter limitation requires innovative hardware, design, careful system design, and large scale production.

N80-25520/1 PC **A17/MF A01**
Operations Research, Inc., Silver Spring, MD. Space Engineering and Communication Systems Div.
A Propagation Effects Handbook for Satellite Systems Design. A Summary of Propagation Impairments on 10-100 Ghz Satellite Links, with Techniques for System Design.
Final Report, May 1979 - Mar. 1980.
R. Kaul, R. Wallace, and G. Kinal. Mar 80, 392p NASA-CR-163207, ORI-TR-1679
Contract NAS5-25725

This handbook provides satellite system engineers with a concise summary of the major propagation effects experienced on Earth-space paths in the 10 to 100 GHz frequency range. The dominant effect, attenuation due to rain, is dealt with in terms of both experimental data from measurements made in the U.S. and Canada, and the mathematical and conceptual models devised to explain the data. Rain systems, rain and attenuation models, depolarization and experimental data are described. The design techniques recommended for predicting propagation effects in Earth-space communications systems are presented. The questions of where in the system design process the effects of propagation should be considered, and what precautions should be taken when applying the propagation results are addressed in order to bridge the gap between the propagation research data and the classical link budget analysis of Earth-space communications system.

N80-25521/9 PC **A02/MF A01**
Axiomatix, Los Angeles, CA.
Critique of the Hughes Aircraft Shuttle Ku Band Leading Edge Bit Synchronizer.
Interim Report.
J. K. Holmes. 5 May 80, 17p NASA-CR-160661, R8005-2
Contract NAS9-15795

A bit synchronizer is analyzed via timing diagrams in a noise-free environment. It is believed that this new bit synchronizer will track the rising edge of the data bits with 25% asymmetry and up to a 90 deg phase shift between the received clock and data bit timing. In addition, the data bits will be demodulated correctly. It is not true that phase shifts larger than 90 deg will necessarily be corrected by this bit synchronizer. However, the specifications currently require the loop to operate over only a + or - 75 deg phase shift between the received data stream leading edges and the bit synchronizer leading edges; consequently, there should be no problem.

N80-25522/7 PC **A12/MF A01**
Axiomatix, Los Angeles, CA.
Shuttle Ku-Band and S-Band Communications Implementation Study.
Final Report.
J. G. Dodds, G. K. Huth, P. W. Nilsen, A. Polydoros, and M. K. Simon. 21 May 80, 274p NASA-CR-160662, R8005-3
Contracts NAS9-15240E, NAS9-15240F

Various aspects of the shuttle orbiter S-band network communication system, the S-band payload communication system, and the Ku-band communication system are considered. A method is proposed for obtaining more accurate S-band antenna patterns of the actual shuttle orbiter vehicle during flight because the preliminary antenna patterns using mock-ups are not realistic that they do not include the effects of additional appendages such as wings and tail structures. The Ku-band communication system is discussed especially the TDRS antenna pointing accuracy with respect to the orbiter and the modifications required and resulting performance characteristics of the convolutionally encoded high data rate return link to maintain bit synchronizer lock on the ground. The TDRS user constraints on data bit clock jitter and data asymmetry on unbalanced QPSK with noisy phase references are included. The S-band payload communication system study is outlined including the advantages and experimental results of a peak regulator design built and evaluated by Axiomatrix for the bent-pipe link versus the existing RMS-type regulator. The nominal sweep rate for the deep-space transponder of 250 Hz/s, and effects of phase noise on the performance of a communication system are analyzed.

PATENT-4 196 448 Not available NTIS
Department of the Navy Washington DC
TV Bandwidth Reduction System Using a Hybrid Discrete Cosine DPCM.
Patent,
Harper J. Whitehouse, Robert W. Means, Edwin H. Wrench, Jr., Jeffrey M. Speiser, and Allan G. Weber. Filed 15 May 78, patented 1 Apr 80, 17p AD-D007 263/7, PAT-APPL-905 902
Supersedes PAT-APPL-905 902-78, AD-D005 228.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An image-compression system, wherein the image consists of a planar array of data points having various brightness levels, comprises a transmitter and a receiver. The transmitter comprises an analog-digital converter, for converting input analog data into digital data. The cosine transform is taken of the incoming digital data to transform the data representing various brightness levels into the frequency domain. The various frequency data points are differentially pulse code modulated, thereby removing line-to-line redundancy, the output data being in parallel form. Timing circuitry is provided for controlling the timing of the various circuits. Circuitry is provided in a receiver for the modulating or decoding of the output signal of the transmitter. (Author)

PB80-191307 CP **T99**
Federal Communications Commission, Washington, DC. Computer Applications Div.
Amateur Master File.
Data file,
W. C. Bushman. 18 Jun 80, mag tape FCC/DF-80/12
Supersedes Rept. no. FCC/DF-80/004, PB80-134083.
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products for price.

The Amateur Radio Service Data File contains data for applicants and licensees operating under the Amateur Radio Service, and the primary information obtained from FCC Form 610, Application for Individual Amateur Radio Service and/or Operator License, and FCC Form 610B, Application for Amateur Club or Military Recreation Station License. Data records include station and license identification, mailing address (all items do not contain Zip Code), radio frequency, issue and expiration dates, and various codes. There are 45,000 records in the file. There are Ten 240 character records in a block, giving a block size of 2400 characters.

PB80-191315 CP **T03**
Federal Communications Commission, Washington, DC. Data Automation Div.
Broadcast AM Data Base (Sometimes Called AM Engineering Data Base).
Data file,
Charles Johnson. May 80, mag tape FCC/DF-80/009
Supersedes Rept. no. FCC/DF-79/016, PB-301 260.
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions.

The AM Update System is designed to maintain and update the AM Engineering Data Base, which is used to support the AM Channel Studies. The system is presently confined to nighttime notified AM Radio Stations. The data contained in the data base file of the AM data base is derived from form 301, (Application for Authority to Construct a New Broadcast Station or Make Changes in an Existing Broadcast Station), submitted by all AM licensees/permittees, and notification lists submitted under NARBA and MEXICAN agreements. The data covers the operating parameters of the AM stations, i.e., frequency, transmitter location, power, etc. The engineering data of the stations are compared against the data of all stations of the same operating frequency for possible interference with each other.

PB80-194442 CP **T04**
Federal Communications Commission, Washington, DC. Computer Applications Div.
Cable Television Community Unit System (CATV1).
Data file,
John M. Giuli. Jun 80, mag tape FCC/DF-80/014
Supersedes Rept. no. FCC/DF-79/005, PB-292 988.
Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions.

The Cable Television Community Unit File contains data for each community served by each cable television system (franchise), including the call sign for each TV station (up to 30) whose programming is distributed via the system. The address (no zip code) of the local community operating facility is available in each record; however, the business mailing address of the parent cable television system is not present but is available via linkage to the associated Cable Television Mail Address File. Additional data relative to participating TV stations is available via linkage to the associated Cable Television TV Station File. File one contains 13,144 records of 1,176 characters each.

PB80-812571 PC **N01/MF N01**
National Technical Information Service, Springfield, VA.
Tropospheric Scatter Communications. 1964-June, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Jun 80,
William E. Reed. Jul 80, 229p
Supersedes NTIS/PS-79/0750 and NTIS/PS-78/0716.

The research covers data transmission, multiplexing, digital, and microwave systems and equipment. Studies on troposcatter propagation are included. Federally-sponsored research as well as some foreign reports are included in the citations. (This updated bibliography contains 22 abstracts, 8 of which are new entries to the previous edition.)

17C. Direction Finding

AD-A085 307/7 MF **A01**
Naval Oceanographic Office NSTL Station MS
Atlantic and Mediterranean Tables of Communication Station Azimuths and LORAN-C Station Azimuths and Distances.
Special publication.
Nov 79, 426p Rept no. NOO-SP-272-1
Supersedes Rept. no. NOO-SP-272.
Availability: Microfiche copies only.

The tables in SP-272-1 are designed for users of the Navy Communications Stations and LORAN-C Stations. The tables give azimuths to communication and LORAN-C stations, and distances to LORAN-C stations. Index diagrams of coverage of the various tables are provided. (Author)

17D. Electromagnetic and Acoustic Countermeasures

PATENT-4 203 365 Not available NTIS
Department of the Navy Washington DC

Jammer Apprehending Amplifier for Proximity Fuzes.
Patent,
Bradshaw Burnham, and Charles F. Nichols.
Filed 20 Jul 77, patented 20 May 80, 5p AD-D007 258/7, PAT-APPL-611 084
Supersedes PAT-APPL-611 084-77.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

In a device for exploding a vehicle in proximity to a target, a proximity control circuit comprising a source of electromagnetic energy, means connected to said source for radiating said energy into space and for intercepting electromagnetic energy therefrom, including any portion of said radiated energy reflected from a target, first circuit means connected to said source and being selectively responsive to said reflected energy for generating an initiating signal, normally ineffective electroresponsive means connected to said last named means for actuating a firing mechanism upon being rendered effective by said initiating signal, and second circuit means connected to said source and to said electroresponsive means being selectively responsive to intercepted energy other than said reflected energy for maintaining said electroresponsive means ineffective until a predetermined time after interception of said other energy. (Author)

17E. Infrared and Ultraviolet Detection

AD-A085 423/2 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Digital Beam Switch for Agile Beam Laser Radar.
Journal article,
Philip D. Henshaw, Antonio Sanchez, and Richard B. McSheehy. 1979, 9p MS-4867A, ESD-TR-79-339
Contract F19628-80-C-0002
Pub. in SPIE, v202 p63-70 1979.

No abstract available.

AD-A085 424/0 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Digital Filters for the Detection of Resolved and Unresolved Targets Embedded in Infrared (IR) Scenes.
Journal article,
Joaquin J. Otazo, and Ronald R. Parenti. 1979, 13p MS-4859, ESD-TR-79-338
Contract F19628-80-C-0002, ARPA Order-600
Pub. in SPIE, v178 p13-24 1979. Prepared in cooperation with Ford Aerospace and Communications Corp., Willow Grove, PA. Engineering Services Div.

No abstract available.

AD-A085 543/7 Not available NTIS
Defence Research Establishment Valcartier (Quebec)
Improved Recorder for a Reconofax XIIIA Infrared Line Scanner,
P. Chevrette. 1977, 14p DRB-REPRINT-4243
Presented at the Remote Sensing Science and Technology Symposium, Ottawa (ontario) on 21-23 Feb 77.
Availability: Pub. in Canadian Jnl. of Remote Sensing, v4 n2 p87-100 Aug 78 (No copies furnished by DTIC/NTIS).

No abstract available.

17F. Magnetic Detection

AD-A085 727/6 PC **A13**/MF **A01**
Institute for Defense Analyses Arlington VA Science and Technology Div
Electromagnetic Fields Induced by Ocean Currents.
Final rept. Jan 77-Dec 78,
Wasyl Wasylkiwskyj. Jul 79, 300p IDA-P-1399, IDA/HQ-79-21012, AD-E500 163
Contract MDA903-79-C-0202

This paper provides a comprehensive account of analytical results for computing electromagnetic fields that are induced by ocean sea water as a result of its motion relative to the geomagnetic field. The emphasis is on the characterization of magnetic field and magnetic field gradient spectra induced by internal waves and surface waves in a deep ocean environment. The theoretical results are formulated so as to be directly applicable to the computation of sea water generated magnetic noise and to the assessment of its deleterious effects on the sensitivity of magnetic sensors employed for magnetic anomaly detection over an open ocean. Magnetic field component and gradient spectra are computed both for stationary and moving sensor observation platforms.

17G. Navigation and Guidance

AD-A085 365/5 PC **A02**/MF **A01**
Stanford Univ CA Edward L Ginzton Lab
Diffraction-Biased Unstable Ring Resonators with Possible Applications in Laser Gyroscopes,
Shinan-Chur Sheng. 5 Mar 79, 7p GL-2985, AFOSR-TR-80-0279
Contract F49620-77-C-0092
Pub. in IEEE Jnl. of Quantum Electronics, vQE-15 n9 p922-926 Sep 79.

No abstract available.

AD-A085 452/1 MF **A01**
Defense Mapping Agency Hydrographic/Topographic Center Washington DC
A Calculator Program for Mixing Mercator and Great Circle Sailings,
John G. Ulrich. Sep 80, 22p
Availability: Microfiche copies only.

The Navigation Department, Defense Mapping Agency Hydrographic/Topographic Center (DMAHTC) has developed a calculator program, self-contained on one magnetic card, which automatically determines course, distance, and total run in Mercator and Great Circle Sailings. This program will list Great Circle positions every 10 deg of longitude and then print course and distance for each leg. Labels designating latitudes and longitudes, and program sections are also shown. The entire program is controlled by six label keys and can be shifted between Mercator and Great Circle at will. It is prepared on a programmable TI-59 with Marine Navigation Module software and printer capability. The program is in use at DMAHTC for compiling distance tables, and navigational publications and answering public inquiries. The following data are incorporated in this article: General Information, Mercator Computation, Great Circle Computation, Great Circle Positions, Great Circle Course Computation, Program Data, and Special Considerations. (Author)

AD-A085 461/2 PC **A02**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
Technical Evaluation Report on the Guidance and Control Panel Symposium (29th) on Air Traffic Management Civil/Military Systems and Technologies.
Advisory rept.,
C. de Bruyn. Mar 80, 21p Rept no. AGARD-AR-149

The GCP symposium was held in Copenhagen, Denmark, 9-12 October, 1979. The program as presented at the symposium is appended to this report. The complete compilation of papers has been published as Conference Proceedings No. 273. (Author)

AD-A085 478/6 PC **A11**/MF **A01**
Royal Aircraft Establishment Farnborough (England)
Contributions to the UK Microwave Landing System Research and Development Programme 1974 to 1978. Volume 1.
Technical rept.,
J. M. Jones. May 79, 242p RAE-TR-79052-VOL-1, DRIC-BR-73155
See also Volume 2, AD-A085 479.

In support of the UK MLS programme, Doppler Microwave Landing System (DMLS) equipment operating on both frequency division and time division multiplex formats has been extensively evaluated by means of analysis, ground and flight tests and hybrid simulation. The results of this programme have shown that the use of the Doppler technique leads to simple and reliable equipment with performance well inside the operational requirements. In particular, a full understanding of the possible environmental effects on system performance at 5 GHz has been obtained. (Author)

AD-A085 479/4 MF **A01**
Royal Aircraft Establishment Farnborough (England)
Contributions to the UK Microwave Landing System Research and Development Programme 1974 to 1978. Volume 2.
Technical rept.,
J. M. Jones. May 79, 68p RAE-TR-79052-VOL-2, DRIC-BR-73762
See also Volume 3, AD-A085 480.
Availability: Microfiche copies only.

For abstract see AD-A085 478.

AD-A085 480/2 MF **A01**
Royal Aircraft Establishment Farnborough (England)
Contributions to the UK Microwave Landing System Research and Development Programme 1974 to 1978. Volume 3.
Technical rept.,
J. M. Jones. May 79, 238p RAE-TR-79052-VOL-3, DRIC-BR-73763
See also Volume 1, AD-A085 478.
Availability: Microfiche copies only.

For abstract see AD-A085 478.

AD-A085 481/0 PC **A08**/MF **A01**
Federal Aviation Administration Washington DC Office of Flight Operations
Airborne Radar Approach, FAA/NASA Gulf of Mexico Helicopter Flight Test Program.
Final rept.,
Donald P. Pate, and James H. Yates. Jan 80, 157p Rept no. FAA/AFO-507-78-2

A joint FAA/NASA helicopter flight test was conducted in the Gulf of Mexico to investigate the airborne weather and mapping radar as an approach system for offshore drilling platforms. Approximately 120 Airborne Radar Approaches (ARA) were flown in a Bell 212 by 15 operational pilots. The objectives of the test were to (1) develop ARA procedures, (2) determine weather minimums, (3) determine pilot acceptability, (4) determine obstacle clearance and airspace requirements. Aircraft position data was analyzed at discrete points along the intermediate, final and missed approach. The radar system error and radar flight technical error were determined in both range and azimuth, and the capability of the radar as an obstacle avoidance system was evaluated. (Author)

AD-A085 482/8 PC **A02**/MF **A01**
Federal Aviation Administration Washington DC Systems Research and Development Service
Discrete Address Beacon System (DABS) Front End Processor/En Route Central Computer Complex Protocol.
Final rept.
Apr 80, 17p Rept no. FAA-RD-80-37

The FAA has developed the Discrete Address Beacon System (DABS) as an evolutionary replacement for the current Air Traffic Control Radar Beacon System (ATCRBS). The DABS sensor, singly and in cooperation with other DABS sensors, will provide surveillance of, and two-way digital communications with aircraft equipped with DABS transponders, and provide surveillance of ATCRBS-equipped aircraft. Surveillance data and data link services will be provided via suitable land lines to Air Traffic Control (ATC) facilities (terminal and en route). The DABS/ATC interface consists of two digital links to each facility: a two-way communications link and a one-way surveillance link from sensor to ATC. The Common ICAO Data Interchange Network (CIDIN) protocol is used on the two-way communications data link. When DABS is interfaced to an en route ATC facility, a special device, called the front end processor (FEP) is used to perform translation between the CIDIN protocol and the protocol used by the En Route Central Computer Complex (CCC). This document defines the protocol to be used between the FEP and the En Route CCC. (Author)

AD-A085 585/8 MF **A01**
National Aviation Facilities Experimental Center Atlantic City NJ
Discrete Address Beacon System (DABS) Baseline Test and Evaluation.
Interim rept. Jun-Sep 79,
M. Holtz, W. Swanseen, M. Karlin, R. Spadea, and D. Fisher. Apr 80, 140p FAA-NA-79-52, FAA-RD-80-36
Availability: Microfiche copies only.

Tests and evaluation (T&E) were conducted principally to determine baseline performance characteristics of the Discrete Address Beacon System (DABS) sensor employing the software and associated parameter values as delivered by Texas Instruments (TI), Incorporated in June 1979. A secondary objective was to highlight those areas where changes in system parameters, made necessary by the maturing of the DABS/Automatic Traffic Advisory and Resolution Service (ATARS) system concept, would require further study and test prior to issuance of the Technical Data Package (TDP). Simulation techniques, targets of opportunity, and DABS transponder-equipped aircraft were used. The DABS sensor test program was accomplished with an Air Traffic Control Radar Beacon System (ATCRBS) 5-foot antenna having a 2.4 deg beam width, and the DABS sensor transmitter power output and effective beam width values as delivered by the contractor. Data reduction and analysis tools developed by the National Aviation Facilities Experimental Center (NAFEC) were used to determine sensor performance characteristics and to highlight areas for further analysis. It was concluded that, with few exceptions, the DABS engineering model in the implementation tested performed in compliance with or exceeded the requirements as defined in the DABS Engineering Requirements (FAA-ER-240-26). Those exceptions are discussed in the body of the report along with recommendations for further activities.

AD-A085 605/4 PC **A03**/MF **A01**
Human Engineering Lab Aberdeen Proving Ground MD
A Computer Assisted Methodology for Aligning the AN/ASN 43 for Doppler (AN/ASN 128) Installation and Calibration.
Final rept.,
Thomas L. Frezell, and Peter J. Grazaitis. Apr 80, 27p Rept no. HEL-TM-8-80

This report deals with a computer assisted methodology to be used in aligning an AN/ASN 43 magnetic flux valve. This procedure is critical for the calibration and alignment of a doppler navigation system. (Author)

AD-A085 606/2 MF **A01**
National Aviation Facilities Experimental Center Atlantic City NJ
Analytical Investigation of Time Correction in Asynchronous Alpha-Beta Tracking Filters with Application to en Route Altitude Tracking.
Robert E. Lefferts. May 80, 30p Rept no. FAA-NA-79-47
Availability: Microfiche copies only.

In the analysis of the alpha-beta tracking filter, it is normally assumed that the tracking filter and data source operate in synchronism at a constant data rate. An analytical solution is obtained for the case in which the tracking filter and data source operate asynchronously, thus violating the standard assumptions. In order to compensate for the asynchronous operation of the filter, the technique of time correction is used to adjust the measured data point via the estimated velocity in order to approximate the synchronous operation of the filter and the data source. A specific example is given in which the influence of time correction on the performance of the altitude tracker is evaluated in terms of the filter performance for extended time-interval position prediction as is used in Conflict Alert. It is shown that errors in the predicted positions, on the order of a few thousand feet, can be introduced if the time-correction process is not incorporated into the altitude tracking algorithm. In addition, it is shown that the magnitude of the errors increases significantly as the altitude change rate increases, while for an altitude tracker with time correction the position prediction performance is essentially constant for all altitude change rates of practical significance. The computational resources required for the implementation of the time-correction process are inconsequential as compared to the total requirements of the tracking functions. (Author)

AD-A085 611/2 PC **A06**/MF **A01**
Facility Checking Squadron (1866th) (Afcs) Scott AFB IL
TRACALS Evaluation Report. SSILS Initial Evaluation Report, AN/GRN-29 Runway 22R, Shaw AFB, South Carolina, 16-26 January 1980.
Final rept.,
John D. Collier. 22 Apr 80, 109p Rept no. 80/66N-201

This report presents the results of the 16-26 January 1980 TRACALS Evaluation of the Shaw AFB AN/GRN-29(V) SSILS serving Runway 22R. The evaluation was conducted to determine the capabilities and limitations of the system in its installed environment, in conjunction with the commissioning of the facility. The effects of terrain and equipment on the antenna radiation patterns are analyzed. Results presented in this report can be used as a guide to anticipated performance until there is a significant change in ground equipment, siting environment, screening, or operational use. (Author)

AD-A085 629/4 PC **A09**/MF **A01**
Federal Aviation Administration Washington DC Systems Research and Development Service
Systems Research and Development Service Report of R&D Activity,
Nathan Aronson, Gary R. Rowland, Donald L. Scheffler, James P. Dugan, and Parker E. Harris, Jr. May 80, 200p Rept no. FAA-RD-80-54

The 26 technical papers contained in this document provide the details of selected topics of major research and development efforts being undertaken by the Systems Research and Development Service of the Federal Aviation Administration. Emphasis is placed on recent achievements and of expected results in the near future. Air Traffic Control Automation Division; Communications and Surveillance Division; Navigation and Landing Division; and Systems Development Division.

AD-A085 640/1 PC **A05**/MF **A01**
Facility Checking Squadron (1866th) (Afcs) Scott AFB IL
TRACALS Evaluation Report. Communications Initial Evaluation Report Incirlik CDI, Turkey 6-15 February 1980.
Final rept.,
Allen C. Mathews. 25 Apr 80, 95p Rept no. 80/66C-198

A Communications Initial Evaluation was performed at Incirlik CDI, Turkey from 6-15 February 1980. The purpose of the evaluation was to define the capabilities and limitations of the ATC communications system. Included in this report are the results and analysis of ground equipment and system measurements, and correlation of predicted and measured receive signal levels as they affect horizontal and vertical coverage. This report can be used as a guide for anticipated performance of the ATC communications system until there is a deletion, addition, relocation of equipment, or a change in the horizon profile. (Author)

AD-A085 646/8 PC **A05**/MF **A01**
MITRE Corp Bedford MA
LORAN Navigation System.
Technical rept.,
J. L. Howard. May 80, 83p M79-206, ESD-TR-80-121
Contract F19628-79-C-0001

LORAN is a highly accurate source of positioning information that can also be used for precision time reference. This report presents an overview of the LORAN navigation system for the general reader. Basic system characteristics and relationships provide a background in LORAN navigation and signal processing that applies to LORAN receivers in current use. Data for available LORAN transmitter chains are included with the report. (Author)

AD-A085 733/4 PC **A03**/MF **A01**
Air Force Environmental Technical Applications Center Scott AFB IL
Wind Factor Simulation Model; Model Description.
Final rept.,
Roger C. Whiton, and Patrick L. Herod. Apr 80, 39p Rept no. USAFETAC/TN-80/001

A simplified, small and efficient Wind Factor Simulation (WFSM) is developed for inclusion in a Military Airlift Command (MAC) airlift system simulation called COLOSSUS. The WFSM calculates climatological wind factors by Sawyer's equivalent headwind technique for arbitrary great circle routes at specified altitudes for any of four seasons in any of three wind options. This technique is combined with the mathematics of great circle navigation in a constellation of seven FORTRAN subprograms. In the WFSM, a simulated aircraft is navigated along a great circle route between any two points on the globe. Involved in the mathematics of the navigation is solving the equation of a great circle. This equation is sometimes transcendental. In those cases, Newton's iterative method for the solution of nonlinear algebraic equations is used. The WFSM also calculates the great circle distance in nautical miles and the initial heading in degrees of any two points whose latitude and longitude are known. (Author)

AD-A085 757/3 PC **A03**/MF **A01**
Boston Coll Chestnut Hill MA Space Data Analysis Lab
Signal Detection/Analysis of Ionospheric and Groundwave Propagation.
Final rept. 1 Jul 75-30 Sep 77,
William C. McComish. 1 Apr 78, 46p BC-SDAL-78-1, RADC-TR-78-198
Contract F19628-76-C-0006

A treatise on the theory and application of various types of analysis and data processing for both ionospheric HF signal propagation and groundwave LF propagation. (Author)

AD-A085 797/9 PC **A05**/MF **A01**
Facility Checking Squadron (1866th) (Afcs) Scott AFB IL
TRACALS Evaluation Report. Communications Initial Evaluation Report, Aviano AB, Italy, 19-27 February 1980.
Final rept.,
Allen C. Mathews. 1 May 80, 93p Rept no. 80/66C-199

A communications Initial Evaluation was performed at Aviano AB, Italy from 19-27 February 1980. The purpose of the evaluation was to define the capabilities and limitations of the ATC communications system. Included in this report are the results and analysis of ground equipment and system measurements, and correlation of predicted and measured receive signal levels as they affect horizontal and vertical coverage. This report can be used as a guide for anticipated performance of the ATC communications system until there is a deletion, addition, relocation of equipment, or a change in the horizon profile. (Author)

N80-25316/4 PC **A03**/MF **A01**
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (Germany, F.R.). Inst. fuer Dynamik der Flugsysteme.
Colored Measurement Noise Digital Prefiltering by Averaging.
R. Froriep. Jul 79, 40p DFVLR-MITT-79-08, ESA-TT-640
Text in German; English Summary. Report Will Also Be Announced as Translation (Esa-TT-640).

A digital prefilter is described which is used to increase the alignment speed of an inertial platform with a Kalman filter. The prefilter averages sampled measurement data with correlated noise data. The system operates with minimal storage requirements and only small computational effort. The choice of filter parameters is discussed using simulation techniques.

PATENT-4 202 516 Not available NTIS
Department of the Air Force Washington DC
Electronic Tripod Technique.
Patent,
Earl H. Benser. Filed 30 Jun 78, patented 13 May 80, 5p AD-D007 280/1, PAT-APPL-921 140
Supersedes PAT-APPL-921 140-78, AD-D005 219.

Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An electronic tripod technique for postlaunch alignment of the roll and pitch gyros of a missile inertial guidance system. Prior to launch, missile gyros are spun up and caged to the missile airframe axes. At launch, gyros are uncaged and slant range to ground measured over an azimuthal sweep symmetrical to the plane of the missile's roll and yaw axes. A roll error signal proportional to the difference between the slant ranges at the sweep extremes is generated and used to torque the roll gyro, resulting in a rotation of the missile about its roll axis until the error signal is zero. This establishes a new roll reference at the roll gyro that is normal to the local vertical. A pitch error signal is then generated that is proportional to the difference between the slant range at either sweep extreme and the slant range at 0 deg azimuth. Similarly, this signal is used to torque the pitch gyro and establish a new pitch reference normal to the local vertical, thus completing the alignment of the roll and pitch gyros to the local vertical. (Author)

PATENT-4 204 210 Not available NTIS
Department of the Air Force Washington DC
Synthetic Array Radar Command Air Launched Missile System.
Patent,
Eddy Hose. Filed 15 Sep 72, patented 20 May 80, 12p AD-D007 274/4, PAT-APPL-288 243
Supersedes PAT-APPL-288 243-72.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A missile guidance system in which a synthetic array radar antenna control system correlates the phase and doppler frequency information contained in signals received by a four quadrant antenna from an illuminated section of terrain, so as to compute the velocity components of the antenna. The velocity components are utilized, in conjunction with the earth rate supplied from a terrestrial navigation system, to maintain the azimuth null plane of the antenna in alignment with a selected target designated by means of a synthetic array map of the illuminated terrain. A missile command system controls the flight path of missile along the azimuth null plane to the target. (Author)

PB80-809023 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Gyrocompasses. 1972-April, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for 1972-Apr 80,
C. Gilbert Young. May 80, 165p
Sponsored in part by National Technical Information Service, Springfield, VA.

These abstracts are on the subjects of gyrocompasses and related areas, such as navigation, inertial navigation, gyrocompass design and construction, and gyrocompass systems. Citations include some on Kalman and other types of electronic systems used in conjunction with the basic gyrocompass unit. Strap down systems are discussed. (Contains 186 citations)

PB80-809031 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Gyroscopes and Gyro-Stabilized Systems. 1975-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1975-Apr 80,
C. Gilbert Young. May 80, 198p
Sponsored in part by National Technical Information Service, Springfield, VA.

The theory, design, construction, applications, and uses of gyroscopes are described in the cited abstracts. Newer types of gyroscopes are included, for example, fiberoptic, electrostatic (ESG), microelectrostatic (MESG), cryogenic or super conducting, nuclear magnetic (NMR), etc. Some applications discussed are geophysical measurements, verifications of Einstein's theories, missile guidance, inertial navigation, platform stabilization, and others. A number of production evaluation tests are included. (Contains 188 citations)

PB80-809049 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Gyroscopes and Gyro-Stabilized Systems. 1964-April, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for 1964-Apr 80,
C. Gilbert Young. May 80, 139p
Sponsored in part by National Technical Information Service, Springfield, VA.

The theory, design, construction, application and use of gyroscopes are described in the cited abstracts. Newer types of gyroscopes are included, for example, fiberoptic, electrostatic (ESG), microelectrostatic (MESG), cryogenic or super conducting, nuclear magnetic (NMR), etc. Some applications discussed are geophysical measurements, verifications of Einstein's theories, missile guidance, inertial navigation, platform stabilization, and others. (Contains 137 citations)

PB80-809056 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Gyroscopes and Gyro-Stabilized Systems. 1974-April, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1974-Apr 80,
C. Gilbert Young. May 80, 180p
Sponsored in part by National Technical Information Service, Springfield, VA.

The theory, design, construction, application and use of gyroscopes are described in the cited abstracts. Newer types of gyroscopes are included, for example, fiber-optic, electrostatic (ESG), microelectrostatic (MESG), cryogenic or super conducting, nuclear magnetic (NMR), etc. Some applications discussed are geophysical measurements, verifications of Einstein's theories, missile guidance, inertial navigation, platform stabilization, and others. (Contains 197 citations)

PB80-812415 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Inertial Navigation and Guidance. June, 1976-June, 1980 (Citations from the NTIS Data Base).
Rept. for Jun 76-Jun 80,
William E. Reed. Jul 80, 224p
Supersedes NTIS/PS-79/0762 and NTIS/PS-78/0735. See also 1964-May, 1979, NTIS/PS-77/0608.

The bibliography cites research reports on the design, development, performance, equipment, and applications of inertial navigation and guidance systems. Reports on strapdown systems are included. (This updated bibliography contains 217 abstracts, 20 of which are new entries to the previous edition.)

PB80-812704 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Omega Navigation System. 1970-June, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1970-Jun 80,
William E. Reed. Jul 80, 199p
Supersedes NTIS/PS-79/0616 and NTIS/PS-78/0557.

Research reports on the development and utilization of the Omega navigation system are cited from worldwide research. Topics include signal propagation, equipment, and operational evaluation. Studies on Differential Omega are also covered. (This updated bibliography contains 193 citations, 5 of which are new entries to the previous edition.)

PB80-812712 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Omega Navigation System. 1964-May, 1980 (Citation from the NTIS Data Base).
Rept. for 1964-May 80,
William E. Reed. Jul 80, 223p
Supersedes NTIS/PS-79/0615 and NTIS/PS-78/0556.

The development and utilization of the Omega navigation system are treated in these Federally-sponsored research reports. Research on signal propagation, equipment, and operational evaluation is presented. Studies on Differential Omega are also included. (This updated bibliography contains 315 abstracts, 17 of which are new entries to the previous edition.)

17H. Optical Detection

AD-A085 433/1 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Large-Format Ebsicon for Low-Light-Level Satellite Surveillance.
Journal article,
Robert Weber. 1979, 7p MS-5144, ESD-TR-79-350
Contract F19628-80-C-0002
Pub. in SPIE, v203 p6-11 1979.

No abstract available.

PAT-APPL-6-145 272 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
Photoelectric Detection System.
Patent Application,
J. R. Currie. Filed 30 Apr 80, 14p N80-25134/1, NASA-CASE-MFS-23776-1
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A photoelectric beam system for the detection of the arrival of an object at a discrete station wherein artificial light, natural light, or no light may be present is described. A signal generator turns a signal light on and off at a selected frequency. When the object in question arrives on station ambient light is blocked by the object and the signal light is reflected onto a photoelectric sensor having a delayed electrical output and of the same frequency as the signal light. Outputs from both the signal source and the photoelectric sensor are fed to inputs of an exclusively OR detector which provides as an output the difference between them. The difference signal is a small width pulse occurring at the frequency of the signal source. This signal is distinguished from those responsive to sunlight, darkness, or 120 Hz artificial light by filter means. In this fashion, An object presence is thereby established.

17I. Radar Detection

AD-A085 375/4 PC **A02**/MF **A01**
Rensselaer Polytechnic Inst Troy NY Dept of Electrical and Systems Engineering
Variable Format Radar Receiver Using a SAW Convolver.
Technical rept.,
P. Das, L. B. Milstein, and D. R. Arsenault. 13 Jul 77, 11p MA-ARO-8, ARO-15004.8-EL
Grant DAAG29-77 G-0205
Pub. in IEEE Transactions on Aerospace and Electronic Systems, vAES-14 n6 p843-852 Nov 78.

No abstract available.

AD-A085 500/7 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Statistical Technique for Radar Amplitude Calibration.
Journal article,
Robert E. Stovall. 5 Mar 79, 10p JA-4916, ESD-TR-79-355
Contract F19628-80-C-0002
Pub. in IEEE Transactions on Aerospace and Electronic Systems, vAES-15 n6 p815-823 Nov 79.

No abstract available.

AD-A085 568/4 PC **A02**/MF **A01**
Rome Air Development Center Griffiss AFB NY
Antenna Technology for Space Based Radar. Part I. Subarraying Feeds: Bandwidth, Low Sidelobe Performance and Subarray Nulling.
Robert J. Mailloux. Feb 80, 19p Rept no. RADC-TR-79-358

This brief analysis outlines the features of a subarraying system with amplitude control circuits at the

feed array face. The analysis treats the idealization of the lens feed as a continuous aperture, and includes the assumption that the cylindrical lens back face is in the far field of the array feed. The analysis includes the effect of truncation at the main array, and demonstrates that the high sidelobes of the conventional sin x/x subarray illumination, when truncated, are primary contributors to high grating lobe levels under certain circumstances. The proposed correction for these truncation effects is to produce a low sidelobe subarray illumination at the main aperture by controlling the feed array taper. Numerical results show the effectiveness of this subarraying technique for controlling the array far sidelobes and grating lobe levels, and for producing wide band null troughs within the subarray pattern. (Author)

AD-A085 570/0 PC **A04**/MF **A01**
Rome Air Development Center Griffiss AFB NY
Detection of Radar Signal Modulations Induced by Target Aircraft Structural Vibrations.
Technical rept.,
John F. Lennon. Sep 79, 60p Rept no. RADC-TR-79-247

The possibility of aircraft identification using radar signal modulations induced by target airframe vibrations is analyzed. Emphasis is placed on detectability of the signal modulation, but attention is given to dependence on the angle of incidence since a major concern is identification at angles where engine effects are not observable. The approach is to compare the strength of the backscatter modulation relative to the unmodulated signal from the aircraft. Since it is the modulation of the signal that is significant, and not the exact radar cross section, a simple wire model representation of the aircraft is used. The radar backscatter results at 7 MHz and 28 MHz are calculated using a modified method-of-moments solution. The method employs successive static electromagnetic scattering solutions from a target where the position of the wing has been changed between calculations. The results are considered as discrete samples of the continuous, modulated signal. The power of the modulation is then estimated by determining the relative power spectra of the modulated signal. An approach that explicitly derives continuous time dependent scatter is included. This uses a simple crossed dipole theory with wing dipole oscillations. The Dipole model, however, requires external information on the location of the appropriate scattering centers along the dipoles. Since this is incident angle dependent, the model becomes cumbersome.

AD-A085 657/5 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
A Velocity Ambiguity which Depends on Target Rotation Rate,
Technical note,
Richard C. Raup. 7 Mar 80, 14p TN-1980-18, ESD-TR-80-19
Contract F19628-80-C-0002

A constant force, zero torque deterministic model for CW radar observations of a rotating rigid target is presented. A velocity ambiguity which depends on the target's rotation rate develops when the target's scattering configuration is unknown and arbitrary. (Author)

AD-A085 743/3 PC **A04**/MF **A01**
Sperry Research Center Sudbury MA
Space-Time Integral Equation Approach to Dielectric Targets.
Final technical rept. 1 Jan -30 Sep 79,
C. L. Bennett, H. Mieras, and R. Lyons. Mar 80, 72p SRC-CR-79-81, RADC-TR-79-356
Contract F30602-79-C-0060

This report describes the extension of the space-time integral equation approach to scattering from dielectric solids. The theory of the space-time integral equation approach is presented and verified by comparison with the classical solution for scattering from a sphere. The technique and solution for scattering from a complex target consisting of wings on a fuselage are presented based on a model closely resembling a Tomahawk missile. Experimental verification of the calculations is provided by time domian scattering range response measurements on a variety of targets. (Author)

AD-A085 788/8 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Aperture Sampling Techniques for Precision Direction Finding.
Journal article,
James E. Evans. 23 May 78, 7p JA-4979, ESD-TR-80-4
Contract F19628-80-C-0002, ARPA Order-2752
Pub. in IEEE Transactions on Aerospace and Electronic Systems, vAES-15 n6 p891-894 Nov 79. Presented at Electro 1978, Boston, MA. 23-25 May 1978.

No abstract available.

PAT-APPL-6-140 551 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Intrusion Detection System Having Look-Up Sensor Instrumentation for Intrusion Range and Altitude Measurements.
Patent Application,
J. L. Porier. Filed 15 Apr 80, 13p AD-D007 288/4
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Range and elevation measurement ambiguities in upward looking intruder detection systems are eliminated by look-up sensor instrumentation that utilizes monostatic and bistatic radar principles. Intruder detection systems that have the capability of monitoring the air space over the perimeter of an area to be protected and that employ radar ranging techniques and guided wave sensor generate only limited or ambiguous intrusion event information. This ambiguity is eliminated by utilizing a transmitter and receiver at one end of the upward looking sensor and a second receiver at the other end. The transmitter and its associated receiver comprises a monostatic radar and the transmitter and the other receiver comprises a bistatic radar. the conventional monostatic radar measures total distance from the transmitter to an intrusion. The bistatic radar measures intrusion altitude only. The two radar outputs are differenced by a processor to determine range.

18. NUCLEAR SCIENCES AND TECHNOLOGY

18A. Fusion Devices (Thermonuclear)

ANL/FPP/TM-128 PC **A07**/MF **A01**
Argonne National Lab., IL.
Impact of Alternate Fusion Fuels on Fusion Reactor Technology: An Initial Assessment Study.
C. C. Baker, A. Bolon, and R. Clemmer. Nov 79, 126p
Contract W-31-109-ENG-38

The initial results of a study carried out to assess some of the technology implications of non-D-T fusion fuel cycles are presented. The primary emphasis in this report is on D-D, catalyzed-D and D-exp 3 He fuel cycles. Tokamaks and field-reversed mirrors have been selected as sample confinement concepts. A new technique of employing neutronic computer codes to study the transport of cyclotron radiation for cases of non-uniform density and temperature profiles is described. The technology areas considered include first wall design considerations, shielding requirements, fuel cycle requirements and some safety and environmental considerations. Conclusions resulting from the study are also presented. (ERA citation 05:021514)

ANL/FPP/TM-130 PC **A03**/MF **A01**
Argonne National Lab., IL.
Evaluation of Organic Moderator/Coolants for Fusion Breeder Blankets.
J. B. Romero. Mar 80, 27p
Contract W-31-109-ENG-38

Organic coolants have several attractive features for fusion breeder blanket design. Their apparent compatibility with lithium and their ideal physical and nuclear properties allows straight-forward, high performance designs. Radiolytic damage can be reduced to about the same order as comparable fission systems by using multiplier/stripper blanket designs. Tritium recovery from the organic should be straightforward, but additional data is needed to make a better assessment of the economics of the process. (ERA citation 05:021512)

CONF-7910122-11 PC **A02**/MF **A01**
JAYCOR, Alexandria, VA.
Convective and Nonconvective Ion Beam Filamentation Instabilities.
R. F. Hubbard. Jan 80, 25p
Contract AC08-79DP40101
Heavy ion fusion workshop, Berkeley, CA, USA, 29 Oct 1979.

The electromagnetic filamentation instability is expected to occur in heavy ion beam fusion target chambers. For a converging beam, the instability is expected to be convective with group velocity V/sub g/ approaching the beam velocity V/sub b/ until the beam is approx. 10-50 cm from the target. The number of e-foldings N/sub gamma / is estimated by integrating the local growth rate along the beam trajectory. For a cold beam, the result agrees with the initial value problem solution of Lee, et al. Detailed numerical solutions to the full dispersion region predict somewhat lower values for N/sub gamma /. Close to the target, v/sub g/ implies 0, and the instability is effectively nonconvective, with N/sub gamma / proportional to the pulse length. If a realistic conductivity model is used (sigma approx. (Z/sub b//R) exp 2), the number of e-foldings in the nonconvective region is generally smaller than N/sub gamma / in the convective region. Thus, any appreciable deterioration in beam quality is more likely to occur while the beam is in the convective region. (ERA citation 05:023368)

CONF-7910122-12 PC **A02**/MF **A01**
JAYCOR, Alexandria, VA.
Knock-on Electrons in the Target Chamber.
R. F. Hubbard, S. A. Goldstein, and D. A. Tidman. 1979, 17p
Contract AC08-79DP40101
Heavy ion fusion workshop, Berkeley, CA, USA, 29 Oct 1979.

It is virtually certain that heavy ion beams will produce massive quantities of knock-on electrons for target chamber pressures above 1 torr. It was shown that the magnitude of the resulting current is more than sufficient to pinch the knock-on beam in most cases, assuming that a substantial fraction of this beam actually gets out ahead of the ion beam pulse. Although at least some of the ion beam experiences this defocusing, the overall effect on beam propagation is minimal if field reversal induced by the ion beam occurs near the beam head. (ERA citation 05:023369)

CONF-791102-146 MF **A01**
Oak Ridge National Lab., TN.
Managing the Fusion Burn to Improve Symbiotic System Performance.
J. P. Renier, and J. G. Martin. 1979, 10p
Contract W-7405-ENG-26
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979. Microfiche copies only.

Symbiotic power systems, in which fissile fuel is produced in fusion-powered factories and burned in thermal reactors characterized by high conversion ratios, constitute an interesting near-term fusion application. It is shown that the economic feasibility of such systems depend on adroit management of the fusion burn. The economics of symbiotes is complex: reprocessing and fabrication of the fusion reactor blankets are important components of the production cost of fissile fuel, but burning fissile material in the breeder blanket raises overall costs and lowers the support ratio. Analyses of factories which assume that the fusion power is constant during an irradiation cycle underestimate their potential. To illustrate the effect of adroit engineering of the fusion burn, this paper analyzes systems based on D-T and semi-catalyzed D-D fusion-powered U-233 breeders. To make the D-T symbiote self-sufficient, tritium is bred in separate lithium blankets designed so as to minimize overall costs. All blankets are assumed to have spherical geometry, with 85% closure. Neutronics depletion calculations were performed with a revised version of the discrete ordinates code XSDRN-PM, using multigroup (100 neutron,

21 gamma-ray groups) coupled cross-section libraries. (ERA citation 05:021515)

CONF-791103-103 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Objectives of the Tokamak Magnetic Fusion Program.
T. C. Jernigan. 1979, 4p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

A brief description of the tokamak program as related to the national magnetic confinement program is given. Primary areas where the ISX and PDX tokamaks are contributing to the program are discussed. (ERA citation 05:023346)

CONF-791103-86 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Analysis of ORNL Fusion Reactor Shield Integral Experiments.
R. T. Santoro, R. G. Alsmiller, Jr., J. M. Barnes, G. T. Chapman, and G. L. Morgan. 1979, 6p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

The nuclear performance of the blanket and shield in a fusion reactor will have a substantial impact on the overall operation and capital cost of the reactor. It is necessary, therefore, to have experimental verification of the nuclear data and radiation transport methods that will be used to carry out the nuclear design calculations for these assemblies. Integral experiments are being performed at the Oak Ridge National Laboratory to provide the experimental data needed for this verification. The verification will be made by extensive comparisons between calculated results and these experimental data. Measurements of the transport of 14-MeV neutrons through laminated shields containing materials that are anticipated for use in fusion applications and the effect of introducing penetrations in the shields will be made. This paper summarizes the results of measurements and calculations to determine neutron and photon spectra behind laminated shields of varying composition and thickness. (ERA citation 05:023351)

CONF-791103-88 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Physics of Burn Control in Tokamak Reactors.
S. E. Attenberger, and W. A. Houlberg. 1979, 4p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

A one-dimensional multifluid transport code was used to investigate some of the critical physics considerations for long burn times in a tokamak fusion reactor. Among these are the effects of helium ash build-up, toroidal field ripple, and fueling in the presence of a divertor. Particle and energy transport models are based on extrapolations from present day devices. (ERA citation 05:023333)

CONF-791103-93 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
D-T And D-D Cycles for Fusion-Powered U-233 Factories.
J. P. Renier, and J. G. Martin. 1979, 7p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

In spite of a low reaction parameter, the semicatalyzed D-D cycle constitutes an interesting alternative for symbiotic systems because it eliminates the need for blanket tritium breeding. Previous work on D-D fusion-fission hybrids concluded that blanket energy multiplication is low and that this cycle may be of interest for ignited plasmas only. Here, it is shown that low multiplication does not penalize the symbiotic system. (ERA citation 05:021516)

CONF-800401-6 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Mass Transfer Deposits in Lithium-Type 316 Stainless Steel Thermal-Convection Loops.
P. F. Tortorelli, and J. H. DeVan. 1980, 16p
Contract W-7405-ENG-26
International conference of liquid metal technology for energy systems, Richland, WA, USA, 20 Apr 1980.

In spatially nonisothermal flowing liquid metal systems, selected constitutents of the containment materials characteristically dissolve into the liquid metal in the hotter zones and are deposited in the colder areas. The accumulation of deposits is often a more serious problem than dissolution because of attendant flow restrictions and, in reactor applications, the aggregation of radioactive species in the coolant circuits. Accordingly, the deposition processes in lithium-type 316 stainless steel thermal convection loops is studied. The morphology and composition of deposits varied with loop operating time. Initially, chromium-rich dendritic crystals formed in the colder region of a loop, but later the deposits changed in structure and contained significant amounts of nickel and iron. Deposition rates were also measured as a function of time and temperature and were correlated with the above observations. A plug extracted from one loop consisted of an aggregate of chromium-rich crystals. (ERA citation 05:021513)

COO-2218-151 PC **A02**/MF **A01**
Illinois Univ. at Urbana-Champaign. Fusion Studies Lab.
Heating by Collisional Slowing of Fast Ions in Non-Circular Tokamaks.
L. M. Hively, J. Rome, and G. H. Miley. 1980, 3p
CONF-800607-1
Contract EY-76-S-02-2218
American Nuclear Society annual meeting, Las Vegas, NV, USA, 8 Jun 1980.

Plasma heating by energetic, charged fusion-products is a crucial issue for obtaining fusion reactors conditions. The evolution of alpha particle density, momentum, kinetic energy and heat flux is important in the study of start-up and ignition scenarios as well as in steady-state operation. Since fast ions have large banana-width guiding-center orbits in tokamaks, the usual locally-defined particle distribution function loses its usefulness. Accordingly, the fast ion collisional slowing-down problem has been formulated to describe these orbits in an axisymmetric, non-circular tokamak. (ERA citation 05:021467)

COO-2218-153 PC **A02**/MF **A01**
Illinois Univ. at Urbana-Champaign. Fusion Studies Lab.
Conceptual Innovations in Hybrid Reactors.
E. Greenspan, and G. H. Miley. 1980, 5p CONF-800446-1
Contract EY-76-S-02-2218
International conference on emerging nuclear energy systems, Lausanne, Switzerland, 8 Apr 1980.

A number of innovations in the conception of fusion-fission hybrid reactors, including the blanket, the fusion driver, the coupling of the fusion and the fission components as well as the application of hybrid reactors are described, and their feasibility assessed. (ERA citation 05:021526)

DOE/DP/40101-1 PC **A02**/MF **A01**
JAYCOR, Alexandria, VA.
Assessment of Scaling Laws and Propagation Windows for Focussing of Ion Beams in Fusion Target Chambers. Final Report.
Apr 80, 12p
Contract AC08-79DP40101

Intense beams of multi-GeV high atomic weight ions are being actively investigated as possible ignitors for pellet fusion reactors. Beam transport models were developed for the final focussing of these beams in the reactor chamber, and investigated the role of microinstabilities, filamentation, conductivity, multiple scattering, and knockon electrons. Two propagation windows exist, namely the vacuum window at pressures below about 10 exp -3 - 10 exp -4 torr and a window around 1 torr. The 1 torr window (which is desirable from a reactor viewpoint) became less certain this year due to our discovery of the major role played by knock-on electrons which are sufficiently numerous to produce a reversed (ion-defocussing) magnetic field ahead of the ion pulse. Unless most of the knock-on current is wiped out by self-fields, this effect appears to eliminate use of self-pinched ion beams, and may degrade ballistic mode spot sizes as well. Intermediate energy knock-on electrons (0.3 less than or equal to v/sub z//V/sub b/ less than or equal to 1) may also dominate the electrical conductivity in the ion pulse, and will influence microinstability and filamentation calculations. (ERA citation 05:021527)

DOE/ET/51010-6 PC **A04**/MF **A01**
Westinghouse Electric Corp., Pittsburgh, PA. Fusion Power Systems Dept.
Conceptual Design of a Commercial Tokamak Hybrid Reactor Fueling System.
K. D. Matney, H. J. Donnert, and T. F. Yang. Dec 79, 57p WFPS-TME-79-032
Contract AC02-77ET51010

A conceptual design of a fuel injection system for CTHR (Commercial Tokamak Hybrid Reactor) is discussed. Initially, relative merits of the cold-fueling concept are compared with those of the hot-fueling concept; that is, fueling where the electron is below 1 eV is compared with fueling where the electron temperature exceeds 100 eV. It is concluded that cold fueling seems to be somewhat more free of drawbacks than hot fueling. Possible implementation of the cold-fueling concept is exploited via frozen-pellet injection. Several methods of achieving frozen-pellet injection are discussed and the light-gas-gun approach is chosen from these possibilities. A modified version of the ORNL Neutral Gas Shielding Model is used to simulate the pellet injection process. From this simulation, the penetration-depth dependent velocity requirement is determined. Finally, with the velocity requirement known, a gas-pressure requirement for the proposed conceptual design is established. The cryogenic fuel-injection and fuel-handling systems are discussed. A possible way to implement the conceptual device is examined along with the attendant effects on the total system. (ERA citation 05:021517)

EUR-CEA-FC-975 PC **A04**/MF **A01**
Association Euratom-CEA sur la Fusion, Centre d'Etudes Nucleaires de Fontenay-aux-Roses (France). Dept. de Physique du Plasma et de la Fusion Controlee.
Turbulent Diffusion in a Magnetic Field.
P. Rolland. Oct 78, 64p
In French.
U.S. Sales Only.

The turbulent diffusion in a magnetic field is studied. The special case where the turbulence is caused by non collisionnal drif instabilities is considered in some detail. (Atomindex citation 11:495636)

EUR-CEA-FC-976 PC **A03**/MF **A01**
Association Euratom-CEA sur la Fusion, Centre d'Etudes Nucleaires de Fontenay-aux-Roses (France). Dept. de Physique du Plasma et de la Fusion Controlee.
Wave Coherent Scattering in WEGA for Detection of Hybrid Waves.
G. Ichtchenko, M. Zymanski, M. Moresco, and E. Zilli. Jan 79, 32p
In French.
U.S. Sales Only.

The aim of the problems is to study the possibility of detecting the penetration of the Lower Hybrid Frequency heating wave by a method of millimeter wave coherent scattering. According to the parameters of WEGA, one calculate the fluctuations of density induced by the hybrid wave, and the characteristics of the scattered signal. The choice of the 2,2 mm wavelength for the experiment of microwave scattering is explained in detail. (Atomindex citation 11:495598)

GA-A-15327 PC **A05**/MF **A01**
General Atomic Co., San Diego, CA.
ZEROD: A Zero Dimensional, Time Dependent Tokamak Plasma Simulation Code for Reactor Scoping Studies.
M. P. Hacker. Feb 80, 85p
Contract AT03-76ET51011

ZEROD integrates in time the volume-averaged electron and ion energy balance equations, as well as particle balance equations for the various ion species. The ion species included are deuterium,

tritium, thermal alpha particles, and one impurity species. The code incorporates models for plasma heating via neutral deuterium beam injection, rf heating by waves in the lower-hybrid frequency regime, control of the burn thermal equilibrium, and fueling. Geometric quantities such as the plasma volume, surface area, profile averaging factors, etc., are calculated on the basis of realistic models for the plasma cross-sectional shape, including circles, ellipses, dees, and doublets. (ERA citation 05:021481)

GA-A-15634 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Instrumentation and Control of the Doublet III Neutral Beam Injector System.
J. C. Kohli, C. D. Moore, D. D. Drobnis, V. P. Elischer, and R. Kilgore. Mar 80, 10p CONF-791102-153
Contract AT03-76ET51016
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

The hardware and software required for the operation of the Doublet III Neutral Beam Injector System (NBIS) are described. Development and implementation of this Instrumentation and Control System was divided between the major participants - General Atomic Company and Lawrence Berkeley Laboratory. The subdivision of responsibilities and the coordination of the participants' activities are described with reference to hardware and software requirements in support of the entire system. Included are a description of the operators' consoles, the interlock system and the CAMAC system. One feature of the control software is source modeling. This feature includes feedback on a shot to shot basis and adaptive control. Adaptive control permits the computer system to automatically adjust parameters after a shot, and to control the system to automatically compensate for time varying NBIS components. The Neutral Beam Power Supply features power supply modeling, fiber optic transmission of analog signals and digital control of power supply power-up/interlocks. (ERA citation 05:023362)

GA-A-15642 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Doublet III Beamline: As-Built.
C. R. Harder, M. M. Holland, J. W. Parker, J. Gunn, and L. Resnick. Mar 80. 10p CONF-791102-151
Contract AT03-76ET51016
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

In order to fully exploit Doublet III capabilities and to study new plasma physics regimes, a Neutral Beam injector System has been constructed. Initially, a two beamline system will supply 7 MW of heat to the plasma. The system is currently being expanded to inject approx. 20 MW of power (6 beamlines). Each beamline is equipped with two Lawrence Berkeley Laboratory type rectangular ion sources with 10 cm x 40 cm extraction grids. These sources will accelerate hydrogen ions to 80 keV, with extracted beam currents in excess of 80 A per source expected. The first completed source is currently being tested and conditioned on the High Voltage Test Stand at Lawrence Livermore Laboratory. This paper pictorially reviews the as-built Doublet III neutral beamline with emphasis on component relation and configuration relative to spatial and source imposed design constraints. (ERA citation 05:021518)

GA-A-15651 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Doublet III Neutral Beam Test Tank Design.
D. W. Doll, J. H. Kamperschroer, and E. W. Bailey. Mar 80, 8p CONF-791102-155
Contract AT03-76ET51016
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

A tank has been designed for testing the Doublet III Neutral Beam Injector which simulates the entrance and pressure conditions of the Doublet III vacuum vessel. The cylindrical shape vacuum vessel is the same size as the neutral beam injector vessel. Contained inside are a cylindrical cryopanel, a V-shaped calorimeter, and a retractable sample-holding device to be used for beam armor proof testing. The cryopanel has 4.2 m of surface for pumping the hydrogen load created by beam impingement on the calorimeter. A tank pressure of 1.3 x 10 exp -2 -1.3 x 10 exp -6 Pa (10 exp -4 -10 exp -8 torr) is to be maintained to simulate the Doublet III vessel pressure conditions. (ERA citation 05:023363)

GA-A-15652 PC **A02**/MF **A01**
Cryogenic Consultants, Inc., Allentown, PA.
Doublet III Neutral Beam Injector Test Tank Cryopanel Design.
D. W. Doll, J. H. Kamperschroer, and P. V. Arend. Mar 80, 8p CONF-791102-154
Contract AT03-76ET51016
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

A simple condensing cryopanel has been designed for the Doublet III neutral beam test tank with a 320,000 liters per second pumping capacity for hydrogen. This maintains a vacuum in the test tank which simulates the Doublet III vessel, 1.3 x 10 exp -3 Pa (approx.10 exp -5 torr). The hydrogen gas load comes from the beam striking the test tank calorimeter and amounts to about 7.2 torr liters per second. The cryopanel is cylindrical shaped with a liquid helium (LHe) surface that pumps through liquid nitrogen (LN) cooled aluminum chevrons located in squirrel-cage fashion around the inside surface of the cylinder. The LHe cooled surface is a smooth cylinder 2.09m in diameter by .69m long with LHe flowing in a approx. 1mm annular space between concentric cylinders. The chevrons which are not blackened are cooled from each end with LN flowing in ring manifolds that serve as the primary cryopanel structure. The LHe is force fed at 55.2 kPa remaining in the liquid phase through the panel. External heat exchanger capability permits use of helium at 3.8 to 4.2 exp 0 K. Normal operating flow rate is 1.4 g/sec for a heat load expected to be 12.2 W total. (ERA citation 05:023364)

IAE-3105 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Atomnoi Energii.
Internal Helical Modes with M > 1 in a Tokamak.
A. B. Mikhalovskii, G. D. Aburdzhaniya, and A. M. Krymskii. 1979, 15p
In Russian.
U.S. Sales Only.

Internal helical modes with m > 1 in a tokamak of a round cross section in a wide range of beta sub(y) parameters (beta sub(y) is a relation of average plasma pressure to average pressure of poloidal magnetic field) are investigated. It is found out that destabilizing effects leading to helical instabilities are significant not only at beta sub(y)< or approximately(a/R)sup(2) (a, R are the small and great radii of the tokamak, respectively), but also at beta sub(y)> or approximately(R/a)sup(2/3). The role of these effects in local and nonlocal helical plasma modes with beta sub(y)> or approximately(R/a)sup(2/3) in supposition of parabolic distribution of plasma pressure along the radius is studied. It is found that the indicated destabilizing effects as a rule are compensated by stabilizing effects of a great pressure gradient similarly to the case of the m=1 mode. The exception is only the local helical mode with m=2, which can be instable if the shear is in some rather narrow range of magnitudes depending on the plasma pressure. (Atomindex citation 11:495621)

IC-78-149 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
View on Reactions of Complete Fusion.
I. I. Delchev, I. J. Petkov, and E. K. Marchev. Nov 78, 11p
U.S. Sales Only.

Complete fusion reactions are analysed within the framework of a theoretical model. Energy density interaction potentials are made use of and are renormalized for the purpose. A large number of heavy ion reactions are studied and the calculated critical angular moments are compared with experimental data. (Atomindex citation 11:495740)

IPPJ-368 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Stabilization of Magnetohydrodynamic Instabilities in a Current-Carrying Stellarator.
K. Matsuoka, and K. Miyamoto. Feb 79, 16p
U.S. Sales Only.

Stable profiles against MHD instabilities are given in a cylindrical current-carrying stellarator. The comparison theorem, i.e., guiding principle for stabilization, is obtained in the same way as in a tokamak. As the external rotational transform due to an l = 2 helical field increases, MHD properties in a stellarator are improved than in a tokamak and the minimum value of q(a) which provides simultaneous stabilization of MHD modes can be lowered less than 2 even without a conducting shell. In an l = 3 stellarator, however, as shown from the Euler equation, the configuration becomes more unstable than in a tokamak and strong tailoring of the current profile is necessary in order to stabilize MHD modes. (Atomindex citation 11:495618)

JAERI-M-7931 PC **A02**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Improvements of the Ruby Laser Oscillator System for Laser Scattering.
T. Yamauchi, K. Kumagai, T. Kawakami, T. Matoba, and A. Funahashi. Oct 78, 17p
In Japanese.
U.S. Sales Only.

A ruby laser oscillator system is used to measure electron temperatures of the Tokamak plasmas(JFT-2 and JFT-2a). Improvements have been made of the laser oscillator to obtain the correct values. Described are the improvements and the damages of a ruby rod and a KD*P crystal for Q-switching by laser beam. Improvement are the linear Xe lamp replaced by a helical Xe lamp and in the electrical circuit for Q-switching. The damage of an optical component by a laser beam should be clarified from the damage data; the cause is not found yet. (Atomindex citation 11:495658)

JAERI-M-7935 PC **A02**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Origin of Metal Impurities in DIVA.
K. Ohasa, S. Sengoku, H. Maeda, H. Ohtsuka, and S. Yamamoto. Oct 78, 21p
U.S. Sales Only.

The origin of metal impurities in DIVA (JFT-2a Tokamak) has been studied experimentally. Three processes of metal impurity release from the first wall were identified; i.e. ion sputtering, evaporation, and arcing. Among of these, ion sputtering is the predominant process in the quiet phase of the discharge, which is characterized by no spikes in the loop voltage and no localized heat flux concentrations on the first wall. "Cones" formation due to the sputtering is observed on the gold protection plate (guard limiter) exposed to about 10,000 discharges by scanning electron micrograph. In the SEM photographs, the spacial distribution of cones on the shell surface due to the ion sputtering coincides with the spacial distribution of intensity of Au-I line radiation. Gold is the dominant metal impurity in DIVA. The honeycomb structure can decrease release of the metal impurity. (Atomindex citation 11:495630)

JAERI-M-7964 PC **A08**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Safety Analysis of Fuel Circulating System for Tokamak Experimental Fusion Reactor.
Dec 78, 161p
In Japanese.
U.S. Sales Only.

Design study and safety analysis on the fuel circulating system (FCS) for a Tokamak experimental fusion reactor have been carried out, in tritium containment and safety. A three-stage containment system of tritium fuel is settled to control tritium release to the environment as low as possible. The system safety is examined by fault trees, failure effect and related analyses. FCS components and piping are designed to minimize leakage into the secondary containment which encloses most of the primary containment. The secondary containment is of glovebox type with an inert gas atmosphere, provided Glovebox Atmosphere Purification System of flow rate 70 m exp 3 /min. The tertiary containment system consists of the rooms enclosing secondary system and tritium-bearing gas processing systems, a 3 m exp 3 /min Atmosphere

Cleanup System and a 150 m exp 3 /min Emergency Containment System. (Atomindex citation 11:495603)

JAERI-M-8013 PC **A02**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Experiment of Hydrogen Beam Introduction to 60,000 L/Sec Cryopump.
J. Sakuraba, T. Ohga, and T. Shibata. Dec 78, 16p
In Japanese.
U.S. Sales Only.

In cryopumps for neutral beam injection system, the high energy beam compatibility of pumps is one of the important problems which are associated with pumping gases. For investigating this problem, hydrogen beam of max. 26.4 KV, 2.7 A, 100 msec pulse at 10% duty cycle was introduced to 60,000 l/sec cryopump. In this experiment, it did not affect the pumping performance. The heat input to cryopanel by beam introduction was 0.52 W/m exp 2 . It was caused by the thermal radiation and the backscattered particles from beam dump. (Atomindex citation 11:495640)

JAERI-M-8042 PC **A04**/MF **A01**
Japan Atomic Energy Research Inst., Tokyo.
Numerical Code SELENE to Calculate Axisymmetric Toroidal MHD Equilibria.
T. Takeda, and T. Tsunematsu. Jan 79, 64p
U.S. Sales Only.

A new algorithm to calculate an MHD equilibrium of axisymmetric toroidal plasmas has been devised and applied successfully to the case of a fixed boundary nonlinear eigenvalue problem. The algorithm is based on a combination of a usual finite element method and a new iteration scheme whereby the mesh structure for calculation is corrected for the finite elements always to be along magnetic surfaces. Very high accuracy is thus attained in the vicinity of the magnetic axis and in the regions where magnetic surfaces are closely located. (Atomindex citation 11:495649)

KFTI-79-7 PC **A02**/MF **A01**
Akademiya Nauk URSR, Kharkov. Fiziko-Tekhnicheskii Inst.
Ohmic Plasma Heating in Closed Magnetic Systems.
V. A. Suprunenko, and Yu. V. Gutarev. 1979, 23p
In Russian.
U.S. Sales Only.

Presented is the analysis of experiments studying the energetic lifetime of electrons in stellarators with the Ohmic plasma heating. It is shown that at large magnitudes of the Ohmic heating current and of longitudinal magnetic field the influence of convective losses, connected with particle diffusion, becomes significant. In the experiments with the relatively low-temperature plasma the losses of heat essentially depend on the character of plasma electric conductivity and obey to the law similar to pseudoclassical one. The maximum value of electron energetic lifetime at the Ohmic heating of turbulent plasma is calculated. The relations obtained are in good agreement with experiments carried out on the existing stellarators. (Atomindex citation 11:495648)

KMSF-U-904 MF **A01**
KMS Fusion, Inc., Ann Arbor, MI.
Measurements of Short-Pulse Backscatter from a Gas Target.
F. J. Mayer, G. E. Busch, C. M. Kinzer, and K. G. Estabrook. 1979, 16p CONF-790564-2
Contracts W-7405-ENG-48, AC08-78DP4003
Annual conference on anomalous absorption of electromagnetic waves, Rochester, NY, USA, 15 May 1979.
Microfiche copies only.

Measurements are reported of short-pulse (100 psec), 1.06 mu m laser backscatter from a high pressure nitrogen gas target. Spectral measurements clearly show the expected Brillouin red shift. The backscatter fraction saturated at approx. 40% at 2 x 10 exp 15 W/cm exp 2 and we have observed what appears to be multiple Brillouin scattering in a long gradient length plasma. (ERA citation 05:021529)

KMSF-U-905 PC **A02**/MF **A01**
KMS Fusion, Inc., Ann Arbor, MI.
Recent Inertial Confinement Fusion Experiments.
R. R. Johnson. 1979, 20p
Contract AC08-78DP40030

The American Laboratories which have conducted laser interaction experiments and are included in this report are KMS Fusion, Inc. (KMSF), Los Alamos Scientific Laboratory (LASL), Laboratory for Laser Energetics (LLE), Lawrence Livermore Laboratory (LLL), and Naval Research Laboratory (NRL). Although information on all aspects of every experimental laboratory is not readily available, it is still possible to define certain experimental areas which are general enough to provide certain commonality between the laboratories. A review is given. (ERA citation 05:021530)

KMSF-U-907 PC **A03**/MF **A01**
KMS Fusion, Inc., Ann Arbor, MI.
Engineering Aspects of Cryogenic Laser-Fusion Targets.
D. L. Musinski, T. M. Henderson, R. J. Simms, T. R. Pattinson, and R. B. Jacobs. 6 Jun 79, 33p CONF-790815-36
Contract AC08-78DP40030
Cryogenic engineering conference, Madison, WI, USA, 21 Aug 1979.

Most current laser-fusion targets consist of hollow spherical glass shells which have been filled with a mixture of gaseous deuterium-tritium fuel. Theoretical considerations suggest that optimum yields can be obtained from these targets if the fuel is condensed as a uniform liquid or solid layer on the inner surface of the glass shell at the time it is irradiated. In principle, this can be accomplished in a straightforward way by cooling the target below the condensation or freezing point of the fuel. In practice, cryogenic targets can appear in routine laser experiments only when the necessary cryogenic technology is reliably integrated into experimental target chambers. Significant progress has been made recently in this field. The authors will discuss the scientific basis and the various engineering features of a system which has allowed the successful irradiation of uniform solid-fuel-layer targets. (ERA citation 05:020221)

KMSF-U-951 PC **A03**/MF **A01**
KMS Fusion, Inc., Ann Arbor, MI.
Laser Fusion Experiments at KMS Fusion, Inc.
H. J. Gomberg. 1979, 31p CONF-791238-1
Contract AC08-78DP40030
13. European conference on laser interaction with matter, Leipzig, German Democratic Republic, 10 Dec 1979.

The laser fusion program at KMS Fusion has been directed toward achieving high density compressions. The limitations in this endeavor have been caused by the small amount of energy which is deposited in the fuel before the implosion occurs. This preheat energy is associated with radiative transport from the conduction front and with the athermal conditions existing in the corona which allows a portion of the high energy electron distribution to penetrate through the target. Targets have been designed and tested which minimize the effect of the electron preheat but since they increase the mass of the target they penalize the laser fusion experiment by requiring much larger laser drivers. The approach taken by KMS Fusion is to attempt to minimize the source of the electron preheat through broadening of the laser bandwidth and operating at shorter wavelengths. (ERA citation 05:021531)

LA-7715-MS PC **A04**/MF **A01**
Los Alamos Scientific Lab., NM.
Anomalous Intense Driver (AID) Concept.
L. E. Thode. Mar 80, 57p
Contract W-7405-ENG-36

An optimized electron bunching mechanism is utilized to efficiently couple the energy of a 5 to 100 MeV, 1 to 30 TW electron beam into a 3 to 50 cm exp 3 plasma of electron density 10 exp 17 to 10 exp 20 cm- exp 3 . An efficient coupling of beam energy and momentum to the plasma is possible due to the relativistic nature of the beam dynamics combined with the short wavelength of the bunching mechanism in a high-density plasma. The rapidly produced multi-kilovolt plasma can be used directly to develop a pulsed neutron and x-ray source. Alternatively, the plasma can be used to drive a hierarchy of inertial confinement or x-ray devices. Utilizing this novel concept, controlled thermonuclear fusion may be achievable within present or near term relativistic electron beam technology. (ERA citation 05:021532)

LAPS-55 PC **A02**/MF **A01**
Science Applications, Inc., La Jolla, CA. Lab. for Applied Plasma Studies.
Possibility of Achieving Ignition in a High Field Ohmically Heated Tokamak.
C. E. Wagner. Apr 80, 21p SAI-023-80-309LJ
Contract EY-76-C-03-1018

There exists a regime in parameter space where a small high-field ohmically-heated tokamak may be capable of reaching thermonuclear ignition. Results of numerical simulations of the minimum ignition conditions are presented which include empirical, sawtooth, and magnetic field ripple diffusion and the effects of impurities. An ignition condition is derived and compared with the results of the numerical simulations. (ERA citation 05:021468)

LBL-10367 PC **A02**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Trace Identification of Cesium and Sodium in Neutral Beam Research.
L. Ruby. Jan. 80, 7p CONF-800607-18
Contract W-7405-ENG-48
American Nuclear Society annual meeting, Las Vegas, NV, USA, 8 Jun 1980.

Cesium and sodium in vapor form are used in two of the approaches to negative-ion production for neutral-beam research. Since fusion reactors are sensitive to the presence of high-Z impurities, it is important to monitor the extent to which the cesium and sodium migrate in the beam direction, or travel as part of the beam itself. Two techniques have been developed for the trace identification of either cesium or sodium on targets placed in vacuum. One of these involves neutron activation, and the other alpha-backscattering, to provide quantitative identification. Three types of targets have been employed, polyethylene which is suitable for the activation technique, beryllium which is useful for the alpha-backscatter analysis, and glassy carbon which is usable with either technique, and therefore, for cross comparison. (ERA citation 05:021519)

N80-26158/9 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Institute of Plasma Physics.
Negative Shear Ferromak for Stabilization of Current Disruptions in Toroidal Discharge.
K. Ikuta. Mar 80, 10p IPPJ-451

A possibility to realized (1=2)+(1=3) magnetic configuration with the help of ferromagnetic material is analyzed with an aim to control the current disruption occuring in Tokamaks. By a careful choice of parameters it is not difficult for a negative shear configuration to be reduced into practice by the use of standard soft irons, where the negative shear configuration means the one whose rotational transform decreases as it moves outwards from the magnetic axis.

N80-26159/7 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
A Quick Start of High Current Discharge from a Cold LAB6 Cathode for Neutral Beam Injection.
J. Uramoto. Mar 80, 21p IPPJ-453

A cathode system with a high current density, long life, fast rise time at discharge, and mechanical simplicity is described for use in the fast neutral beam injection of thermonuclear fusion. A cold LaB6 cathode with a large heat capacity can be used for a high current discharge which needs a fast rise time (below 0.1 sec) if the discharge is fired twice in series. The temperature decay of the cathode after the first discharge held to a very slow rise time to protect the cathode) is very slow. The second discharge rises up quickly due to remaining heat and the effective plasma confinement in the cathode system even if a time interval between in the first and the second is near 30 sec.

ORNL/Sub-21453/2 PC **A03**/MF **A01**
Varian Associates, Inc., Palo Alto, CA.

60 GHz and 110 GHz Development Program. Quarterly Report No.2, October-December 1979.
J. Shively, C. Conner, H. Jory, D. Stone, and R. Symons. 1979, 42p
Contract W-7405-ENG-26

The objective of this program has been changed from developing a microwave amplifier or oscillator capable of producing 200 kW cw power output at 110 GHz to developing families of microwave oscillators capable of producing 200 kW of peak power output at 60 GHz and some higher frequency, possibly 90 GHz or 110 GHz, with pulse durations at 100 ms, 30 s and cw. The use of cyclotron resonance interaction is being pursued. The early design phases of this program are discussed. (ERA citation 05:023365)

PAT-APPL-6-030 044 PC **A03**/MF **A01**
Department of Energy, Washington, DC.
Method and Apparatus for Timing of Laser Beams in a Multiple Laser Beam Fusion System.
Patent Application,
J. M. Eastman, and T. L. Miller. Filed 13 Apr 79, 32p
Contract EY-76-C-02-2812
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The optical path lengths of a plurality of comparison laser beams directed to impinge upon a common target from different directions are compared to that of a master laser beam by using an optical heterodyne interferometric detection technique. The technique consists of frequency shifting the master laser beam and combining the master beam with a first one of the comparison laser beams to produce a time-varying heterodyne interference pattern which is detected by a photodetector to produce an AC electrical signal indicative of the difference in the optical path lengths of the two beams which were combined. The optical path length of this first comparison laser beam is adjusted to compensate for the detected difference in the optical path lengths of the two beams. The optical path lengths of all of the comparison laser beams are made equal to the optical path length of the master laser beam by repeating the optical path length adjustment process for each of the comparison laser beams. In this manner, the comparison laser beams are synchornized or timed to arrive at the target within +- 1 x 10- exp 12 second of each other. (ERA citation 05:025072)

SFTI-2 PC **A03**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Sukhumi. Fiziko-Tekhnicheskii Inst.
High-Temperature Plasma Interferometry in the Millimeter and Submillimeter Ranges.
N. I. Malykh, E. P. Gorbunov, and E. S. Yampol'skii. 1978, 26p
In Russian.
U.S. Sales Only.

The diagnostics of high-temperature plasma: the measurement of the charged particle density, in particular, on installations of the tokamak type by the methods of interferometry in the millimetre and submillimetre ranges is given. The main information on utilization of multichannel interferometry at the tokamaks in the USSR are presented. The investigations performed permit to make the following conclusions. Apparatus and methods for measuring of the plasma density relief are in a still greater development. For the tokamak installations the most suitable range is from 0.1 to 3 mm. A tendency to shortening of the wavelength, mainly with the necessity of reduction of refraction angles is observed. The main generators in the submillimetre range is a lazer. A lazer with optical pumping from the COsub(2) lazer is a perspective one. In connection with durability of the processes in the tokamaks for measuring systems become acceptable mechanical devices: frequency shifters, scanning phasometers, mechanical switches. (Atomindex citation 11:495615)

UCID-18542 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Beam Loss by Collimation in a Neutralizer Duct.
G. W. Hamilton, and P. A. Willmann. 3 Apr 80, 14p
Contract W-7405-ENG-48

Beam fractions lost by collimation in a neutralizer duct are computed in x-x' phase space by using three examples of slab beam distributions under a broad range of duct dimensions, beam half-widths, and beam divergences. The results can be used to design compact neutralizers and to specify beam requirements. The computer code ILOST can be used under a broad range of beam conditions to compute the fraction lost by collimation. (ERA citation 05:021521)

UCRL-Trans-11562 MF **A01**
2. Engineering Problems of the Reconstruction of the Tokamak-10 Facility.
V. A. Glukhikh, L. B. Dinaburg, and N. I. Doinikov. Jan 80, 16p
Contract W-7405-ENG-48
A Conference on engineering problems of thermonuclear reactors, Leningrad, USSR, June 28, 1977, pp 26-41, CONF-7706118.
Microfiche copies only.

The following basic physics tasks will be handled at the T-10M facility: (1) The development and investigation of methods of additional plasma heating to a temperature of approximately 5 keV. (2) Investigation of the thermal insulation of the plasma, particularly of the ion component at ion temperatures to 5 keV. (3) Investigation of the processes of entry and the dynamics of impurity atoms in the plasma column. (4) Simulation of the conditions of a two-component tokamak. (5) Investigation of processes at the plasma-wall boundary at energy flux densities comparable to the flux densities in the reactor. (ERA citation 05:023350)

UCRL-Trans-11563 PC **A02**/MF **A01**
III. Techniques of Plasma Production and Heat. 32. Plan for the Plasma Microwave-Heating System at the T-10M Facility.
V. A. Flyagin, V. V. Alikaev, S. N. Vlasov, A. G. Luchinin, and G. S. Nusinovich. Jan 80, 10p
Contract W-7405-ENG-48
A Conference on engineering problems of thermonuclear reactors, Leningrad, USSR, June 28, 1977, pp 3-9, CONF-7706118.

In the T-10M facility it is proposed to use an ordinary wave whose electric field during transverse propagation is parallel to the longitudinal magnetostatic field of the chamber. Such a wave can be introduced into the tokamak from the outside of the torus, where there are large ports in the vacuum chamber of the apparatus. The width of the plasma layer in which microwave energy is absorbed decreases as the angle between the wave vector K vector and the direction of the chamber longitudinal magnetic field H vector approaches 90 exp 0 . To test this assertion experimentally in the T-10M facility, it is proposed to provide adjustment of the angle of injection of microwave radiation into the tokamak. (ERA citation 05:023367)

UCRL-15212 PC **A03**/MF **A01**
Illinois Univ. at Urbana-Champaign. Dept. of Electrical Engineering.
Investigation on Cryogenic Laser Fusion Targets: Fabrication, Characterization, and Transport. Annual Report, December 1, 1978-November 30, 1979.
K. Kim. 1979, 42p
Contract W-7405-ENG-48

The research has been directed toward fabrication, characterization, and positioning of cryogenic shell laser fusion targets, with particular emphasis on the development of a scheme which would allow for continuous fabrication, inspection, and delivery of the targets. Specifically, progress has been made in the following areas: (1) Fabrication of a uniform spherical shell of DT-condensate using a cold-wall target-freezing-cell. (2) Fabrication of a uniform spherical shell of liquid DT using a room-temperature wall target-freezing-cell. (3) Support-free cryogenic target fabrication using cold-gas-levitation. (4) Continuous fabrication of cryogenic targets using free-fall method. (5) Automatic characterization of DT-layer uniformity. (6) Sorting of DT-filled glass microshells using an interference microscope. (7) Development of an a-c interference microscope for accurate characterization of moving targets. (8) Development of a machine which is capable of producing a continuous stream of uniform DT spheres of controllable sizes. (9) Theoretical study on the behavior of liquid hydrogen contained in a spherical shell. (ERA citation 05:020222)

UCRL-82984 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Startup of Reversed-Field Mirror Reactors Using Coaxial Plasma Guns.
A. C. Smith, Jr., C. W. Hartman, G. A. Carlson, W. S. Neef, Jr., and J. L. Eddleman. 9 Nov 79, 5p CONF-791102-137
Contract W-7405-ENG-48
Symposium on engineering problems of fusion research, San Francisco, CA, USA, 13 Nov 1979.

Preliminary calculations are given that indicate that a coaxial plasma gun might scale reasonably to reactor-grade operating conditions. Ongoing experiments and numerical simulations should shed some light on the validity of the described scaling laws. (ERA citation 05:021522)

UCRL-84002 MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Laser Fusion Experiments, Facilities and Diagnostics at Lawrence Livermore Laboratory.
H. G. Ahlstrom. Feb 80, 96p CONF-800208-12
Contract W-7405-ENG-48
Tropical meeting on inertial confinement fusion, San Diego, CA, USA, 26 Feb 1980.
Microfiche copies only.

The progress of the LLL Laser Fusion Program to achieve high gain thermonuclear micro-explosions is discussed. Many experiments have been successfully performed and diagnosed using the large complex, 10-beam, 30 TW Shiva laser system. A 400 kJ design of the 20-beam Nova laser has been completed. The construction of the first phase of this facility has begun. New diagnostic instruments are described which provide one with new and improved resolution, information on laser absorption and scattering, thermal energy flow, suprathermal electrons and their effects, and final fuel conditions. Measurements were made on the absorption and Brillouin scattering for target irradiations at both 1.064 mu m and 532 nm. These measurements confirm the expected increased absorption and reduced scattering at the shorter wavelength. Implosion experiments have been performed which have produced final fuel densities over the range of 10x to 100x liquid DT density. (ERA citation 05:021536)

UCRL-84107 MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Liquid-Metal Aspects of HYLIFE.
W. R. Meier, N. J. Hoffman, and M. W. McDowell. 1980, 22p CONF-800401-9
Contract W-7405-ENG-48
International conference of liquid metal technology for energy systems, Richland, WA, USA, 20 Apr 1980.
Microfiche copies only.

The High Yield Lithium Injection Fusion Energy (HYLIFE) converter is a reactor concept for an inertial fusion electric power plant. In this concept, flowing molten lithium protects the structures of the fusion chamber from the deleterious effects of deuterium-tritium (DT) fusion reactions and converts the pulsed fusion energy into steay thermal power. Lithium is circulated as the primary coolant to transfer heat to an intermediate sodium loop which drives a superheated steam cycle. Lithium is also the source of the tritium fuel which is recovered via a molten-salt extraction process. The liquid-metal aspects of the HYLIFE plant with particular emphasis on the lithium systems. (ERA citation 05:023359)

UCRL-84236 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.

Effects of End Cell Ion Cyclotron Fluctuations on Central-Cell Ion Confinement in the Tandem Mirror Experiment (TMX).
D. P. Grubb, T. A. Casper, and J. F. Clauser. 7 Apr 80, 10p CONF-800441-3
Contract W-7405-ENG-48
International symposium on physics and open-ended fusion systems, Tsukuba, Japan, 15 Apr 1980.

The tandem mirror device (TMX) exhibits gross stability to both MHD and microinstability modes. The end-cell plasmas provide the tandem with average minimum-B stability, while the efflux of plasma from the central cell maintains the end cells (plugs) at marginal stability to loss cone modes. For some operating conditions, a residual level of plug ion cyclotron fluctuations is detected. These oscillations dominate the fluctuation frequency spectra in both the plugs and the central cell. The presence of plug ion cyclotron fluctuations in the central cell leads to resonance heating of some of the central cell ions. This heating degrades the confinement of the central cell ions; thereby increasing the amount of warm plasma stream flowing through the plugs. (ERA citation 05:023343)

UCRL-84252 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Current Results of the Tandem Mirror Experiment.
R. P. Drake. 9 Apr 80, 11p CONF-800441-2
Contract W-7405-ENG-48
International symposium on physics and open-ended fusion systems, Tsukuba, Japan, 15 Apr 1980.

The basic operating characteristics of the Tandem Mirror Experiment, (TMX) at the Lawrence Livermore Laboratory in the USA have been established. Tandem-mirror plasmas have been produced using neutral-beam-fueled end plugs and a gas-fueled center cell. An axial potential well between the end plugs has been measured. There is direct evidence that this potential well enhances the axial confinement of the center-cell ions. The observed densities and loss currents are consistent with preliminary studies of the particle sources and losses near the magnetic axis. The observed confinement is consistent with theory when plasma fluctuations are low. When the requirement of drift-cyclotron loss-cone mode stability is violated, the plasma fluctuations degrade the center-cell confinement. (ERA citation 05:023349)

WFPS-TME-79-021 PC **A07**/MF **A01**
Westinghouse Electric Corp., Pittsburgh, PA. Fusion Power Systems Dept.
Blanket Design Study for a Commercial Tokamak Hybrid Reactor (CTHR).
D. L. Chapin, L. Green, A. Y. Lee, M. E. Culbert, and J. L. Kelly. Sep 79, 129p
Contract EG-77-C-02-4544

The results are presented of a study on two blanket design concepts for application in a Commercial Tokamak Hybrid Reactor (CTHR). Both blankets operate on the U-Pu cycle and are designed to achieve tritium self-sufficiency while maximizing the fissile fuel production within thermal and mechanical design constraints. The two blanket concepts that were evaluated were: (1) a UC fueled, stainless steel clad and structure, helium cooled blanket; and (2) a UO sub 2 fueled, zircaloy clad, stainless steel structure, boiling water cooled blanket. Two different tritium breeding media, Li sub 2 O and LiH, were evaluated for use in both blanket concepts. The use of lead as a neutron multiplier or reflector and graphite as a reflector was also considered for both blankets. (ERA citation 05:021500)

WFPS-TME-79-032 PC **A04**/MF **A01**
Kansas State Univ., Manhattan. Dept. of Nuclear Engineering.
Conceptual Design of a Commercial Tokamak Hybrid Reactor Fueling System.
K. D. Matney, H. J. Donnert, and T. F. Yang. Dec 79, 60p
Contract EG-77-C-02-4231

A conceptual design of a fuel injection system for CTHR (Commercial Tokamak Hybrid Reactor) is discussed. Initially, relative merits of the cold-fueling concept are compared with those of the hot-fueling concept; that is, fueling where the electron temperature is below 1 eV is compared with fueling where the electron temperature exceeds 100 eV. It is concluded that cold fueling seems to be somewhat more free of drawbacks than hot fueling. Possible implementation of the cold-fueling concept is exploited via frozen-pellet injection. Several methods of achieving frozen-pellet injection are discussed and the light-gas-gun approach is chosen from these possibilities. A modified version of the ORNL Neutral Gas Shielding Model is used to simulate the pellet injection process. From this simulation, the penetration-depth dependent velocity requirement is determined. Finally, with the velocity requirement known, a gas-pressure requirement for the proposed conceptual design is established. The cryogenic fuel-injection and fuel-handling systems are discussed. A possible way to implement the conceptual device is examined along with the attendant effects on the total system. (ERA citation 05:021523)

WFPS-TME-80-003 PC **A03**/MF **A01**
Columbia Univ., New York. Dept. of Applied Physics and Nuclear Engineering.
Determination of Nonaxisymmetric Equilibrium.
D. Elkin. Jan 80, 44p
Contract EG-77-C-02-4231
Thesis.

The Princeton Equilibrium Code is modified to determine the equilibrium surfaces for a large aspect ratio toroidal system with helical magnetic fields. The code may easily be made to include any variety of modes. Verification of the code is made by comparison with an analytic solution for l = 3. Previously observed shifting of the magnetic axis with increasing pressure or with a changed externally applied vertical field is obtained. The case l = 0, a bumpy torus, gives convergence only for the lenient convergence tolerance of epsilon/sub b/ = 1.0 x 10- exp 2 . (ERA citation 05:021511)

18C. Nuclear Explosions

AD-A085 318/4 MF **A01**
General Electric Co Santa Barbara CA TEMPO
Operation HARDTACK. Volume II. Radiological Safety. Extracted Version.
Final rept.
1 Oct 79, 161p
Contract DNA001-79-C-0455
Availability: Microfiche copies only.

This is the final report of the RADSAFE operation during the HARDTACK Series of nuclear tests in the Pacific. Forecast and actual fallout is presented. (Author)

AD-A085 663/3 PC **A04**/MF **A01**
SRI International Menlo Park CA
Experiments on Extinction of Fires by Airblast; Flame Displacement as an Extinction Mechanism.
Annual rept.,
Stanley B. Martin. May 80, 52p
Contract DCPA01-79-C-0245

Current uncertainties regarding interactions of blast waves on fires preclude reliable estimates of the outcome of a nuclear attack on the United States. This study focuses on the threshold airblast condition for extinguishing fires initiated by thermal radiation. Flame blowout tests with simulated nuclear air-blast waves were conducted in the SRI-developed shock-tube facility on class-B fires both in a flat plate geometry and stabilized behind barriers. The results support the concept of flame displacement as a mechanism of extinguishment. Data on class A fuels in practical configurations are needed next. (Author)

AD-A085 715/1 PC **A06**/MF **A01**
Kaman AviDyne Burlington MA
PIVUL - A Computer Code for Rapid Assessment of the Vulnerability of Simple Structures to Blast.
Final rept. 14 Jan 74-31 Aug 75,
Norman P. Hobbs, and Kenneth R. Wetmore. Mar 80, 103p KA-TR-125, ARBRL-CR-00417, AD-E430 454
Contract DAAD05-74-C-0742

This report presents the methodology which led to the development of a vulnerability code, PIVUL, for utilization in rapid damage assessment of simple structural elements subjected to nuclear blast environment. The basic concept of blast damage assessment employed in the report is the pressure-impulse approach. Light, moderate, and heavy damage are considered.

AD-A085 725/0 PC **A07**/MF **A01**
Science Applications Inc El Segundo CA
Airblast Attenuation Experiments for the M-X Trench.
Topical rept. 5 Jul 77-31 Dec 78,
Duane T. Hove, and James E. Craig. 31 Dec 78, 150p SAI-79-546-LA, DNA-4677T, AD-E300 798
Contract DNA001-77-C-0280

A series of experiments were performed in the NASA Ames Electric Arc Shock Tube to investigate the propagation of strong shock waves in tubes with transverse ribs. The experiments were designed to measure shock attenuation, end wall reflected pressures, wall drag and flowfield structure to provide a basis for development of computer models for analysis of blast wave propagation in the M-X trench. Shock attenuation was found to be dependent on shock strengths but apparently not strongly dependent on rib design. Entrance region effects appeared to play a strong role in the attenuation; no effect of flow Reynolds number was observed. Laser shadowgrams and interferograms revealed a complex two-dimensional flowfield in the vicinity of the shock with no indication of fully developed pipe flow seven diameters behind the shock. Wall drag measurements exceeded estimates from steady flow theory; a simple wave drag model gave estimates somewhat closer to the measurements. End wall measurements were initially higher than expected from conventional reflection factors presumably due to the nonuniform flowfields. Test data should be applicable to the prototype trench since scale effects were not observed. Two-dimensional flowfield calculations are required to understand the entrance region and shock attenuation process. Design tools developed for prototype assessment should be able to predict the experimental shock wave time of arrival, strength attenuation, and waveforms.

AD-A085 726/8 PC **A09**/MF **A01**
Civil Systems Inc Albuquerque NM
Misers Bluff Phase I Single Burst Experiments. Ground Shock Analysis.
Interim rept. 1 Oct 77-1 Jan 78,
Jimmie L. Bratton, and James S. Phillips. 17 Mar 78, 189p DNA-5004Z, AD-E300 799
Contract DNA001-77-C-0301

The single burst events of Misers Bluff Phase I provided the basic data for use in evaluation of the superposition principles in predicting the ground shock effects of multiburst experiments. In addition, it provided an opportunity for evaluating the current empirical procedures for predicting the ground shock effects of high explosive experiments. Evaluation of the single burst empirical predictions and the superposition principle as a part of the multiburst experiments of Phase I will allow an evaluation of the uncertainties one might expect in making empirical predictions of a multiburst weapons effect environment. The current state-of-the-art in empirical ground shock predictions of high explosive experiments are discussed and utilized in the pretest predictions for each of the 5 single burst experiments discussed in this report. The apparent deficiencies and the problems associated with use of the nuclear weapons effects predictions procedures for high explosive experiments are discussed in some detail. The phenomenology associated with these experiments is discussed and related to the waveforms observed in various experiments. This understanding of the single burst phenomenology will provide the basis for understanding the small yield multiburst experiments also conducted as a part of Phase I of the Misers Bluff program. The predictions are then compared with the measurements on a component by component basis. Conclusions regarding the validity of the prediction procedures are drawn.

AD-A085 758/1 MF **A01**
Engineering Decision Analysis Co Inc Irvine CA

Summary of Structural Evaluation and Design Support for the Underground Nuclear Test Program.
Final rept. Jun 78-Jul 79,
Robert P. Kennedy, Stephen A. Short, and Thomas R. Kipp. 1 Jul 79, 85p EDAC-177-040.1, DNA-5084F, AD-E300 801
Contract DNA001-78-C-0281
Availability: Microfiche copies only.

During the period from June 1978 through July 1979, Engineering Decision Analysis Company, Inc., (EDAC) was under contract to provide structural evaluation and design support for the underground nuclear test program. This effort including the design and evaluation of containment structures for the DIABLO HAWK MINERS IRON and HURON KING events, design and evaluation of shock mounting systems, data reduction and evaluation of results for the DIABLO HAWK and HYBLA GOLD Tunnel Environment Monitor System (TEMS) and DIABLO HAWK High Speed Camera experiments and evaluations in support of future large cavity events. This report in a single volume, provides documentation of various design and analysis tasks accomplished under this contract.

AD-A085 761/5 PC **A03**/MF **A01**
SRI International Menlo Park CA
Some Ramifications of the Power-Law Spectral Index for Propagation Modeling.
Topical rept. 1 Jan-30 Sep 79,
Charles L. Rino. 1 Oct 79, 38p DNA-5078T, AD-E300 802
Contract DNA001-77-C-0038

Accurate modeling of radio-wave propagation phenomena is important for verifying our understanding of the physics of ionospheric instabilities that structure the ambient electron density as well as predicting deleterious systems effects. New results in radio-wave propagation theory have quantified the relationship between the power-law index that characterizes the average striation size distribution and the signal structure under strong scatter conditions. This report discusses some ramifications for propagation modeling of these new theoretical results. The phase structure function and various functionals of it characterize the striation environment for predictive modeling. Two very different approximations to the phase structure function are currently being used. One, an asymptotic approximation, is valid when the one-dimensional phase spectral density function falls off less rapidly than f-3. The other, a quadratic approximation derived from the formal Taylor series expansion of the phase structure function, is valid when the one-dimensional phase spectral density function falls off more rapidly than f-3. The f-3 power law marks an important transition in the behavior of the complex signal moments. For the f-3 and more steeply sloped phase spectral density functions, the large-scale structure exerts a strong influence on the signal statistics.

AD-A085 776/3 PC **A11**/MF **A01**
JAYCOR Alexandria VA
Operation WIGWAM, Series Volume, Oceanic Test.
1st edition,
S. E. Weary, W. J. Ozeroff, J. L. Sperling, and B. Collins. 30 May 80, 244p JAYCOR-2087-79-02, DNA-8000F
Contract DNA001-78-C-0311

This report describes the activities of DoD participants in the atmospheric nuclear test series, Operation WIGWAM, which involved only one deep underwater shot in the Pacific, approximately 500 miles southwest of San Diego, CA. WIGWAM was essentially a single service operation with minimal AEC and contractor participation. The various levels at which Dod personnel participated within the Joint Task Group 7 are identified.

NVO-0623-T1 MF **A01**
CER Nuclear Corp., Mercury, NV.
Project Rio Blanco. Exhibits: Informal Public Hearings, Denver, Colorado, March 27-28, 1972.
1972, 253p
Contract EY-76-C-08-0623
Portions of document are illegible.
Microfiche copies only.

The Oil Shale Corporation is opposed to Project Rio Blanco which plans to use underground nuclear explosions for natural gas production stimulation because it believes the risk from such detonations as damage to oil shale and mineral deposits near the Rio Blanco site exceed the value of the recoverable gas produced. Statements and written evidence presented to the US AEC to support the Shale Oil Corp.'s position are presented. Information is included on the geologic characteristics of the area, seismic and environmental effects of the contemplated explosion, and economic feasibility of Rio Blanco as compared with potential cost of damage to oil shale deposits. (ERA citation 05:022871)

NVO-0623-T2 PC **A07**/MF **A01**
CER Nuclear Corp., Mercury, NV.
Project Rio Blanco. Transcript: Informal Public Hearings, Meeker, Colorado, March 24, 1972.
1972, 126p
Contract EY-76-C-08-0623

The March 24, 1972 hearings of the US AEC held in Meeker, Colorado is reported verbatim. This hearing's purpose was to receive comments on the Draft Environmental Statement on the proposed Rio Blanco Project for nuclear stimulation of natural gas production. (ERA citation 05:022872)

NVO-0623-T3 PC **A10**/MF **A01**
CER Nuclear Corp., Mercury, NV.
Project Rio Blanco. Transcript: Informal Public Hearings, Denver, Colorado, March 27-28, 1972.
1972, 220p
Contract EY-76-C-08-0623

The March 24, 1972 hearings in Denver, Colorado, held by the US AEC to receive comments on the Draft Environmental Statement for the Rio Blanco Natural Gas Stimulation project is reported verbatim. (ERA citation 05:022873)

18D. Nuclear Instrumentation

CONF-791051-20 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Status Report on Activities of ASTM E10.05.01 Task Group on Uncertainty Analysis.
F. B. K. Kam, and F. W. Stallman. 1979, 8p
Contract W-7405-ENG-26
ASTM-EURATOM symposium on reactor dosimetry, Ispra, Italy, 1 Oct 1979.

Uncertainties in the field of reactor dosimetry are analyzed. A survey on uncertainty analysis as it is practiced at leading laboratories which are involved in reactor dosimetry is described. A questionnaire was prepared and mailed to about 45 installations and researchers. Nine replies were received, several of them were prepared by more than one author. Three of the nine came from installations outside the US. Results and the questionnaire are presented. (ERA citation 05:021090)

LA-UR-80-755 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Application of a New Containment and Surveillance Portal Monitor Data Analysis Method.
J. C. Pratt, C. N. Henry, and R. D. Hastings. 1980, 1p CONF-800315-10
Contract W-7405-ENG-36
Symposium of the European Safeguards Research and Development Association, Edinburgh, UK, 26 Mar 1980.

A new method for processing the information available from an ordinary doorway monitor in an earlier report is described. Additional tests of this concept on doorway monitors at facilities of the Los Alamos Scientific Laboratory have been made. The lessons learned and estimates of the sensitivity of this method for detection of a trickle of special nuclear material through the portal are presented. (ERA citation 05:020210)

PB80-191406 Not available NTIS
National Bureau of Standards, Washington, DC.
Temperature and Humidity Effects on the Gamma-Ray Response and Stability of Plastic and Dyed Plastic Dosimeters.
Final rept.,
H. Levine, W. L. McLaughlin, and A. Miller. 1980, 24p
Pub. in Radiat. Phys. Chem. 14, p551-574 1980.

Several plastics and dyed plastics are widely used for routine dosimetry in radiation processing with gamma radiation. A study was made of the effects of different temperatures and relative humidities during and after irradiation on the dose interpretation of these dosimeters, which are normally calibrated under controlled laboratory conditions. Samples of dosimeter materials investigated were cellulose triacetate, polycarbonate, polyethylene terephthalate, polyvinyl fluoride, dyed polymethyl methacrylate ('red Perspex'), undyed polymethyl methacrylate (UVT Lucite), dyed Nylon, dyed polyvinyl pyrrolidone, dyed and undyed polyvinyl chloride, dyed polyvinyl butyral, and dyed Cellophane or Ultraphan. The results show that most of these dosimeters when used under extreme conditions of relative humidity and temperature may give erroneous readings unless suitable corrections are made. There is also indications that the environmental effects on dosimeter response are apt to differ somewhat from one supply of a given material to another.

18E. Nuclear Power Plants

CONF-800454-1 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Depending on the Grace of God Is No Way to Protect the Health and Safety of the Public.
M. Bender. 1980, 8p
Contract W-7405-ENG-26
ANS executive conference, Washington, DC, USA, 20 Apr 1980.

Aspects of nuclear power plant safety are discussed. (ERA citation 05:020660)

NUREG/CR-1258-V-2 PC **A04**/MF **A01**
Lawrence Livermore National Lab., CA.
Inspection Methods for Physical Protection Project: Annual Report, March 1979 through February 1980.
R. T. Bradley, D. D. Bowden, A. W. Olson, F. Rogue, and J. W. Savage. Jun 80, 59p UCID-18123-79-4

This is the annual report to the U.S. Nuclear Regulatory Commission (NRC) of progress at Lawrence Livermore National Laboratory (LLL) during the first year of the Inspection Methods for Physical Protection project. This report details the activities of the first year of work that culminated in delivery of field-test drafts of new procedures for inspecting the physical protection systems at nuclear power reactor sites.

NUREG/CR-1315 PC **A04**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
The Feasibility of Field Evaluation of Physical Protection Procedures.
Jack W. Savage. May 80, 75p UCRL-52740

In a task for the U.S. Nuclear Regulatory Commission (NRC) Office of Inspection and Enforcement (IE), the Lawrence Livermore Laboratory (LLL) has studied the feasibility of developing a methodology for field evaluation of physical protection procedures by IE physical protection inspectors, and has determined that such a methodology is feasible. A logic diagram was used to analyze physical protection procedures and identify the resources needed for their successful execution. The dependence of response procedures on the availability of resources and on the exercise of preparatory support procedures prior to need for response is discussed. The effects of plant conditions and external influences that affect procedure execution are also discussed. The need for specific compliance and adequacy reference requirements derived from the regulations and licensee approved plans is explained.

NUREG/CR-1368 PC **A07**/MF **A01**
Sandia National Labs., Albuquerque, NM.
Development of a Checklist for Evaluating Maintenance, Test and Calibration Procedures Used in Nuclear Power Plants.
Formal technical rept. 14 Feb 79-14 Mar 80,
Robert L. Brune, and Meyer Weinstein. May 80, 150p SAND-80-7053

Prepared in cooperation with Human Performance Technologies, Inc., Thousand Oaks, CA.

The report describes the process for developing a checklist to be used by the U.S. Nuclear Regulatory Commission Office of Inspection and Enforcement (I & E) inspectors during their evaluation of maintenance, test and calibration procedures. The objective of the checklist is to aid inspectors in identifying procedural characteristics that can lead to human performance deficiencies. Five nuclear power plants were surveyed to obtain a sample of procedures and related information for human factors evaluation. Procedural deficiencies were identified. In addition, a human factors analysis of 988 LERs submitted during the period 1975 through 1978 was performed to identify the major categories of procedures-related personnel error. Checklist items aimed at correcting these errors were developed. The checklist and suggested methods of application are presented.

NUREG/CR-1385 PC **A11**/MF **A01**
Sandia National Labs., Albuquerque, NM.
Development of a 'Good' Physical Protection Plan - Capability 73.45(b),
Harold A. Bennett, M. Teresa Olascoaga, and Steve A. Bloedel. Jun 80, 230p SAND-80-7027
Prepared in cooperation with Allied-General Nuclear Services, Barnwell, SC.

This report describes the development and documentation of a partial physical protection plan for a hypothetical facility. This work provides limited testing of the NRC Fixed-Site Physical Protection Upgrade Rule Design Guidance Compendium and of a methodology for evaluating physical protection system performance relative to the Upgrade Rule, 10 CFR Part 73.45.

NUREG/CR-1464 PC **A06**/MF **A01**
Oak Ridge National Lab., TN.
Review of Nuclear Power Plant Offsite Power Source Reliability and Related Recommended Changes to the NRC Rules and Regulations,
R. E. Battle, F. H. Clark, and T. W. Reddoch. Jun 80, 112p ORNL/NUREG/TM-384
Contract W-7405-eng-26

Offsite power failures at the Millstone 2, Turkey Point 3 and 4, and Indian Point 3 and 4 nuclear power plants caused the U.S. Nuclear Regulatory Commission (NRC) to question the reliability of the offsite power. The NRC requested Oak Ridge National Laboratory (ORNL) to examine several aspects of the offsite power system and to make recommendations to improve the NRC licensing procedure. The specific tasks that were undertaken for this project are the following: (1) evaluate the Florida Power and Light (FPL) and the Consolidated Edison (ConEd) system-wide blackouts of 1977, (2) survey the complete losses of offsite power at nuclear power plants, (3) evaluate a method to improve the security of the offsite power, (4) determine the maximum decay rate of the grid frequency, (5) evaluate a long-term dynamics computer code, and (6) generate and evaluate a method to identify critical system parameters.

NUREG-0675-SUP-9 PC **A05**/MF **A01**
Nuclear Regulatory Commission, Washington, DC. Office of Nuclear Reactor Regulation.
Operation of Diablo Canyon Nuclear Power Station, Units 1 and 2, Pacific Gas and Electric Company, Supplement No. 9. Docket Nos. 50-275 and 50-323.
Safety evaluation rept.
Jun 80, 79p

Supplement No. 9 to the Safety Evaluation Report for Pacific Gas and Electric Company's application for licenses to operate the Diablo Canyon Nuclear Power Station (Docket Nos. 50-275 and 50-323) located in San Luis Obispo County, California has been prepared by the Office of Nuclear Reactor Regulation of the Nuclear Regulatory Commission. The purpose of this Supplement is to update the Safety Evaluation Report by providing the staff's evaluation of additional information submitted by the applicant since the issuance of Supplement No. 8 to the Safety Evaluation Report. Subject to favorable resolution of the items discussed in the Safety Evaluation Report and its supplements, the staff concludes that the plant can be operated by the Pacific Gas and Electric Company without endangering the health and safety of the public.

NUREG-0680 PC **A12**/MF **A01**
Nuclear Regulatory Commission, Washington, DC. Office of Nuclear Reactor Regulation.
TMI-1 Restart: Evaluation of Licensee's Compliance with the Short- and Long-Term Items of Section II of the NRC Order dated August 9, 1979, Metropolitan Edison Company, et al., Three Mile Island Nuclear Station, Unit 1. Docket 50-289.
Jun 80, 253p

Based on the review to date, as discussed in the body of this evaluation and tabulated in the Status Summary, it has been concluded that for a significant majority of individual items and sub-items of the Order, the licensee is in compliance with the requirements of the Order. Discussions with the licensee are continuing on the remaining open items, and after submittal of additional required information and completion of the review, further reports on these matters will be given in a supplement to this evaluation. As noted above, it is expected to make further recommendations regarding additional items to be required of the licensee, beyond those now listed in the Order. Any recommendation by the Staff to authorize restart of TMI-1 will be made only after further resolution of presently open items, definition of any additional required items, and compliance by the licensee with those additional requirements.

SAND-80-0667 MF **A01**
MHB Technical Associates, San Jose, CA.
Improving the Safety of LWR Power Plants. Final Report.
Apr 80, 300p ALO-62
Contract EY-76-C-04-0789
Microfiche copies only.

This report documents the results of the Study to identify current, potential research issues and efforts for improving the safety of Light Water Reactor (LWR) power plants. This final report describes the work accomplished, the results obtained, the problem areas, and the recommended solutions. Specifically, for each of the issues identified in this report for improving the safety of LWR power plants, a description is provided in detail of the safety significance, the current status (including information sources, status of technical knowledge, problem solution and current activities), and the suggestions for further research and development. Further, the issues are ranked for action into high, medium, and low priority with respect to primarily (a) improved safety (e.g. potential reduction in public risk and occupational exposure), and secondly (b) reduction in safety-related costs (improving or maintaining level of safety with simpler systems or in a more cost-effective manner). (ERA citation 05:022460)

SAND-80-0721C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Systems Approach to Tamper Protection.
W. C. Myre, and M. J. Eaton. 1980, 5p CONF-800315-18
Contract EY-76-C-04-0789
Symposium of the European Safeguards Research and Development Association, Edinburgh, UK, 26 Mar 1980.

Tamper-protection is a fundamental requirement of effective containment and surveillance systems. Cost effective designs require that the tamper protection requirements be considered early in the design phase and at the system level. A discussion of tamper protection alternatives as well as an illustrative example system is presented. (ERA citation 05:020213)

UNI/SFM-3 PC **A02**/MF **A01**
UNC Nuclear Industries, Inc., Richland, WA.
Planning for Decommissioning of the Shippingport Atomic Power Station.
R. L. Miller. 11 Apr 80, 12p
Contract EY-76-C-06-1857

Upon completion of defueling, Shippingport becomes the responsibility of the US Department of Energy's Surplus Facilities Management Program (SFMP) to decommission. Initial decommissioning activities will be concurrent with end-of-life testing and defueling of the reactor. The proposed government action is to dismantle Shippingport, to place the site in a radiologically safe condition following completion of dismantling and to perform the decommissioning in such a manner so as to provide engineering, technology and cost information for future projects. The decommissioning assessment and environmental assessment are described. (ERA citation 05:020605)

18F. Radiation Shielding and Protection

CEA-R-4950 PC **A03**/MF **A01**
CEA Centre d'Etudes de Limeil, Villeneuve-Saint-Georges (France).
Application of a Grad Expansion to the Transport of Neutrons.
P. Hoffman, J. Salmon, and M. Vuillemin. Dec 78, 39p
In French.
U.S. Sales Only.

Inside a reactor, when the drift velocity of the neutron gas is small with respect to its velocity of thermal agitation, it is possible to introduce an approximation in the usual Grad expansion and to obtain a simple form of the neutron distribution as a function of the components of their individual velocities and of the usual moments. Carrying that distribution into Boltzmann's equation, and integrating conveniently, one obtains equations of the hydrodynamic type. The terms which express the influence of collisions contain noticeable functions which are characteristic of the nature of the nuclei and of the neutron temperature. In the case of a spherical fast-neutron reactor, the determination of the multiplication coefficient boils down to the integration of four differential equations. The results thus obtained for a certain number of configurations are compared with those obtained with the D.S.N. method. (Atomindex citation 11:495942)

CONF-7810231-1 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Lecture 3: The Methods and Applications of Discrete Ordinates in Low Energy Neutron-Photon Transport (ANISN, DOT). Part I. Methods.
W. W. Engle, Jr. 1978, 17p
Contract W-7405-ENG-26
Computer techniques in shielding and dosimetry meeting, Erice, Sicily, Italy, 25 Oct 1978.

A rather complete description of the derivation of the finite difference form of the transport equation can be found in earlier work; therefore that derivation is discussed here. Attention is focused on the additional equations required to solve the transport equation which are often referred to as flux models and on the iteration process and efforts to accelerate the convergence of the iteration process. All equations discussed here are limited to the one-dimensional, time-independent case, but they may be extended in a straightforward manner to multidimensional, time-dependent geometries. (ERA citation 05:021438)

CONF-791103-100 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Repair for Scattering Expansion Truncation Errors in Transport Calculations.
M. B. Emmett, R. L. Childs, and W. A. Rhoades. 1980, 6p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

Legendre expansion of angular scattering distributions is usually limited to P sub 3 in practical transport calculations. This truncation often results in non-trivial errors, especially alternating negative and positive lateral scattering peaks. The effect is especially prominent in forward-peaked situations such as the within-group component of the Compton Scattering of gammas. Increasing the expansion to P sub 7 often makes the peaks larger and narrower. Ward demonstrated an accurate repair, but his method requires special cross section sets and codes. The DOT IV code provides fully-compatible, but heuristic, repair of the erroneous scattering. An analytical Klein-Nishina estimator, newly available in the MORSE code, allows a test of this

method. In the MORSE calculation, particle scattering histories are calculated in the usual way, with scoring by an estimator routine at each collision site. Results for both the conventional P sub 3 estimator and the analytical estimator were obtained. In the DOT calculation, the source moments are expanded into the directional representation at each iteration. Optionally a sorting procedure removes all negatives, and removes enough small positive values to restore particle conservation. The effect of this is to replace the alternating positive and negative values with positive values of plausible magnitude. The accuracy of those values is examined herein. (ERA citation 05:023296)

CONF-791103-90 PC A02/MF A01
MB Associates, San Ramon, CA.
Rigid Hoist Articulated Grapple System Development for Enhanced Remote Maintenance.
C. Witham, P. White, and J. Garin. 1979, 24p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

Remote maintenance and repair within nuclear environments have become more demanding of remote manipulation equipment in the last few years. A deficiency exists in the array of tools available for dexterous operations of loads in the 180-kg range. The development of a manipulation system with enhanced operator controls is discussed. This system is a six-degree-of-freedom manipulator with bilateral servo control. It is to be attached to a mobile support boom in order to operate throughout the nuclear cell. The manipulator is intended to work in conjunction with light duty servomanipulators, overhead crane systems, and through-the-wall mechanical master slaves. (ERA citation 05:021016)

CONF-791103-96 PC A02/MF A01
Oak Ridge National Lab., TN.
Overview of CSEWG Shielding Benchmark Problems.
R. E. Maerker. 1979, 6p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

The fundamental philosophy behind the choosing of CSEWG shielding benchmarks is that the accuracy of a certain range of cross section data be adequately tested. The benchmarks, therefore, consist of measurements and calculations of these measurements. Calculations for which there are no measurements provide little information on the adequacy of the data, although they can perhaps indicate the sensitivity of results to variations in data. (ERA citation 05:021442)

CONF-791223-6 PC A02/MF A01
Oak Ridge National Lab., TN.
Recent Capture Cross Section Data from ORELA Above 2.6 KeV.
R. L. Macklin, R. R. Winters, and J. Halperin. 1979, 10p
Contract W-7405-ENG-26
NEANDC specialist meeting on neutron cross sections of fission product nuclei, Bologna, Italy, 12 Dec 1979.

Neutron capture by natural rhodium (exp 103 Rh) and enriched stable isotopes of ruthenium (100 to 104) and palladium (104 to 110) were measured at the Oak Ridge Electron Linear Accelerator pulsed neutron facility. Average pure isotope cross sections from three to several hundred keV were derived. The neutron flux shape was determined relative to ENDF/B V standard exp 6 Li(n, alpha) and exp 235 U(n,f) cross sections below and above 70 keV respectively. Strength functions were adjusted to fit the data by least squares. The exp 101 Ru fission product would appear to cause less poisoning than exp 105 Pd or exp 103 Rh in plutonium fueled fast reactors. (ERA citation 05:021443)

CONF-800205-7 PC A02/MF A01
Oak Ridge National Lab., TN.
Crystal Defect Studies Using X-Ray Diffuse Scattering.
B. C. Larson. 1980, 19p
Contract W-7405-ENG-26
American Institute of Metallurgical Engineers meeting, Las Vegas, NV, USA, Feb 1980.

Microscopic lattice defects such as point (single atom) defects, dislocation loops, and solute precipitates are characterized by local electronic density changes at the defect sites and by distortions of the lattice structure surrounding the defects. The effect of these interruptions of the crystal lattice on the scattering of x-rays is considered in this paper, and examples are presented of the use of the diffuse scattering to study the defects. X-ray studies of self-interstitials in electron irradiated aluminum and copper are discussed in terms of the identification of the interstitial configuration. Methods for detecting the onset of point defect aggregation into dislocation loops are considered and new techniques for the determination of separate size distributions for vacancy loops and interstitial loops are presented. Direct comparisons of dislocation loop measurements by x-rays with existing electron microscopy studies of dislocation loops indicate agreement for larger size loops, but x-ray measurements report higher concentrations in the smaller loop range. Methods for distinguishing between loops and three-dimensional precipitates are discussed and possibilities for detailed studies considered. A comparison of dislocation loop size distributions obtained from integral diffuse scattering measurements with those from TEM show a discrepancy in the smaller sizes similar to that described above. (ERA citation 05:023297)

CONF-800607-12 PC A02/MF A01
EG and G Idaho, Inc., Idaho Falls.
Short Collision Time Approximation for Neutron Scattering Using Discrete Frequency Distributions.
J. M. Ryskamp. 1980, 7p
Contract EY-76-C-07-1570
American Nuclear Society annual meeting, Las Vegas, NV, USA, 8 Jun 1980.

A completely general form for computing any scattering cross section based on the incoherent approximation without extending f(omega) to negative frequencies and without integrating over the complex plane is presented. A simple derivation of the short collision time approximation for discrete frequency distributions is also given. The approximation works well for large incident neutron energies when the duration of a collision is short compared with the natural periods of atomic motion. Single-differential scattering cross sections for light water as computed with the free proton and Nelkin scattering models at 561 exp 0 K, and the short collision time approximation with T/sub eff/ = 1468 exp 0 K, are shown for an incident neutron energy of 1.0 eV. 1 figure. (ERA citation 05:023299)

EFI-347(5)-79 PC A02/MF A01
Erevanskii Fizicheskii Inst. (USSR).
Difference in Characteristics of Nuclear-Cascade Showers Generated by Hadrons at Different Depths in the Ionization Calorimeter.
N. G. Boyadzhyan, and M. I. Keropyan. 1979, 10p
In Russian.
U.S. Sales Only.

The analysis of approximately 700 nuclear showers in iron has been carried out in the energy range of 0.6-2.0 TeV. The characteristics of cascades initiated by neutrons were compared with those of charged particles. The rapidity of the development and absorption process of nuclear-electron cascades, hadron showers generated at small depths (X<=160 gxcm exp -2) are equal and do not depend on the charge of the "primary" cascade. The showers generated by neutrons and charged particles at depths X>=160 gxcm exp -2 differ from each other by their absorption characteristics. (Atomindex citation 11:495944)

FEI-839 MF A01
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Obninsk. Fiziko-Energeticheskii Inst.
Methods of Numerical Solution of Diffusion Coefficients. Diffusion from a Prompt Source of beta -Radioisotopes (Mu =400 1/cm).
L. V. Pavlinov, and O. A. Zolotukhina. 1978, 17p
In Russian.
U.S. Sales Only. Microfiche copies only.

Developed is a numerical method of calculating the diffusion coefficient D of beta -radioactive elements for the case when the diffusion occurs from a prompt source to semiinfinite medium. A computer program has been prepared, using which tabulated is the dependence of the (D.T.) value on the ratio of the integral activity value I(Xsub(n),t)/I(0,t)=0.95-0.05 with the spacing of 0.02 (I(Xsub(n),t) is the value of the integral activity of a sample after removing the thickness layer Xsub(n) at time moment t), and values of Xsub(n)=0.0005sub(n)-0.0500cm with the spacing of 0.0005cm for X=0.0005-0.0100cm, and 0.0010cm for Xsub(n)=0.0110-O.0500cm for beta -radioactive elements with the absorption coefficient of mu =400l/cm. (Atomindex citation 11:495946)

JINR-R-1-12253 PC A02/MF A01
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.
Role of Vavilov-Cherenkov Radiation in Experiments on the Optical Transition Radiation.
V. P. Zrelov, and J. Ruzicka. 1979, 19p
In Russian.
U.S. Sales Only.

The angular distributions of transition radiation (TR) arising on the vacuum-metal boundary and directed towards metal have been calculated on the basis of TR general equations. Such properties of Vavilov-Cherenkov radiation in the absorbing medium as its directional property, polarization and radiation energy are considered in detail. Special attention is drawn to the considerable contribution of VaVilov-Cherenkov radiation to the intensity of the radiation, observed in experiments on optical TR. In particular, the coincidence of theoretical and experimental curves in the case of the systematic anticoincidence of TR levels is explained. A new explanation is given to the appearance of the perpendicular component. Different "forward" and "backward" background levels are explained. (Atomindex citation 11:495950)

JINR-R-3-11868 PC A02/MF A01
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics.
Quantum Effects at the Storage of Ultracold Neutrons on a Plane.
V. I. Lushchikov, and A. I. Frank. 1978, 6p
In Russian.
U.S. Sales Only.

Considered are some problems, associated with storing neutrons on a horizontal plane with a minimum energy of a vertical motion. An experiment on passing minimum energy neutrons through a slot using an inhomogeneous magnetic field has been suggested. Such a neutron flux amounts approximately 10 exp -3 of the total flux. The flux value can be changed in wide ranges by changing the magnetic field value and the direction of neutron polarization. Given is a classical estimate of neutron life time on the plane-tau approximately 20 s. (Atomindex citation 11:495943)

18G. Radioactive Wastes and Fission Products

BNL-NUREG-27235 PC A02/MF A01
Brookhaven National Lab., Upton, NY.
Characterization of Organics in Leachates from Low-Level Radioactive Waste Disposal Sites.
A. J. Francis, C. R. Iden, B. Nine, and C. Chang. 1979, 18p CONF-790602-93
Contract EY-76-C-02-0016
ANS annual meeting, Atlanta, GA, USA, 3 Jun 1979.

Low-level radioactive wastes generated by the nuclear industry, universities, research institutions, and hospitals are disposed of in shallow-land trenches and pits. In 1962 the first commercial disposal site was opened in Beatty, Nevada. Since then, the industry has grown to include three private companies operating six disposal areas located in sparsely populated areas: at Maxey Flats (Morehead), Kentucky; Beatty, Nevada; Sheffield, Illinois; Barnwell, South Carolina; West Valley, New York; and Richland, Washington. Although the facilities are operated by private industry, they are located on public land and are subject to federal and state regulation. Although inventories of the radioactive materials buried in the disposal sites

are available, no specific records are kept on the kinds and quantities of organic wastes buried. In general, the organic wastes consist of contaminated paper, packing materials, clothing, plastics, ion-exchange resins, scintillation vials, solvents, chemicals, decontamination fluids, carcasses of experimental animals, and solidification agents. Radionuclides such as exp 14 C, exp 3 H, exp 90 Sr, exp 134 exp 137 Cs, exp 60 Co, exp 241 Am, and exp 238 exp 239 exp 240 Pu have been identified in leachate samples collected from several trenches at Maxey Flats and West Valley. The purpose of this report is to identify some of the organic compounds present in high concentrations in trench leachates at the disposal sites in order to begin to evaluate their effect on radionuclide mobilization and contamination of the environment. (ERA citation 05:020153)

CONF-791103-104 MF **A01**
Oak Ridge National Lab., TN.
System for Measuring Fission-Gas Inventories of HTGR Fuel Particles.
J. M. Robbins, M. J. Kania, E. L. Long, Jr., and W. T. Rainey, Jr. 1979, 18p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.
Microfiche copies only.

A Postirradiation Gas Analyzer (PGA) has been designed and built at Oak Ridge National Laboratory for quantitatively measuring the fission- and reactive-gas inventories of irradiated High-Temperature Gas-Cooled Reactor (HTGR) fuel particles. Individual particles can be broken at ambient temperature or after heating to 2000 exp 0 C, and the various gases released are quantitatively analyzed. The measure of coating integrity is determined by comparing the fission-gas inventories of the particles to their theoretical yields. (ERA citation 05:020606)

CONF-791103-91 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Scale System Cross Section Validation with Shipping-Cask Critical Experiments.
R. M. Westfall, and J. R. Knight. 1979, 7p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

Results are presented of 70 critical experiments simulating LWR fuel element shipping casks and storage pools. Four series of experiments were analyzed: 2.35% enriched UO sub 2 rods at a lattice pitch of 2.032 cm, 4.29 % enriched rods at 2.54 cm pitch, and these lattices positioned between simulated Pb and depleted U shields. Results show that each of the three libraries (ENDF/B-IV, GAM-THERMOS, Hansen-Roach) is adequate. 2 tables. (ERA citation 05:021012)

CONF-791103-98 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Interrelation of Short-Term Leach Tests and Long-Term Leaching.
E. L. Compere, and H. W. Godbee. 1979, 6p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

A standard leach test must permit accumulation of sufficient data to determine material parameters, such as figures of merit (FOMs) in a short time. Leach test results should be extended to other sizes, longer times, other temperatures, and other leaching solutions. This paper provides insights into the complexities in interpreting leach tests. (ERA citation 05:020154)

CONF-791112-50 PC **A02**/MF **A01**
Argonne National Lab., IL.
Characterization of Impact Fracture of Brittle Solid-Waste Forms.
W. J. Mecham, L. J. Jardine, R. H. Pelto, and M. J. Steindler. 1979, 13p
Contract W-31-109-ENG-38
Symposium on the scientific basis for nuclear waste management, Boston, MA, USA, 26 Nov 1979.

This paper presents a methodology for analyzing particle size distributions obtained in impact testing of brittle waste-form materials. The methodology includes (a) a linear two-parameter lognormal correlation of the weight fraction less than any given size, (b) a mathematical function of the two lognormal parameters to determine the total surface area in terms of a dimensionless shape factor, and (c) a surface-energy constant to predict the anticipated increase of surface area from the known energy absorbed in the impact of the brittle material. Preliminary measurements were made on impacted simulated glass specimens. The analysis is used as an example of the methodology. These results are also compared with reanalyzed impact test data reported by others. (ERA citation 05:020130)

CONF-791112-57 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Development and Characterization of Cermet Forms for Radioactive Waste.
W. S. Aaron, T. C. Quinby, and E. H. Kobisk. 1979, 8p
Contract W-7405-ENG-26
Symposium on the scientific basis for nuclear waste management, Boston, MA, USA, 26 Nov 1979.

Cermets designed to isolate high-level wastes in a solid form are a composite consisting of various ceramic phase particles uniformly dispersed in and microencapsulated by an iron-nickel base alloy matrix. The metal matrix provides this waste form with many advantageous features including excellent thermal conductivity and mechanical strength. These cermets are formed by first dissolving the waste in molten urea, precipitating and calcining all the constituents, compacting the calcine, and sintering and reduction to form the final product. The exact formulation of cermets through additions to the waste is designed to fix most of the fission products in stable, leach resistant ceramic phases which are subsequently microencapsulated by an alloy matrix. The alloy matrix, which is derived primarily from the waste itself and includes the reducible fission and activation products from the waste, can be compositionally adjusted through additions to optimize its corrosion resistance under conditions existing in various disposal environments. The processes by which cermets are formed include several new and unique materials preparation options that are being developed to permit engineering scale-up and to be compatible with remote operations. Cermets formed by alternate processing methods are being characterized. Initially, cermet samples were prepared using a laboratory scale, batch process developed for the preparation of special ceramics having high compositional uniformity and excellent sinterability. The modification of this batch process to one suitable for scale-up and remote operation is the subject of this paper. Cermet characterization is also discussed. (ERA citation 05:020140)

CONF-791112-58 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Chemical Reactions in the Bedrock-Groundwater System of Importance for the Sorption of Actinides.
G. W. Beall, B. Allard, T. Krajewski, and G. D. O'Kelley. 1979, 7p
Contract W-7405-ENG-26
Symposium on the scientific basis for nuclear waste management, Boston, MA, USA, 26 Nov 1979.

Most suggested alternatives for deep underground disposal of high-level radioactive wastes rely upon several independent barriers like resistant canister materials, waste forms of low solubility in groundwaters and the use of back-fill material of low permeability and with nuclide retaining capacity. These barriers would retard the eventual release of radionuclides from the repository into the groundwater/bedrock system. The final and the only non-engineered barrier would be the host-rock itself. It would be desirable if the rock alone would be able to retain the long-lived radionuclides coming from the waste for long enough times to allow decay to harmless activity levels before they might reach the biosphere. The biological hazards from high-level reprocessng waste as well as from unreprocessed spent uranium fuel are dominated by the actinides and their daughter products (americium, plutonium, neptunium, thorium, radium) from about three hundred years after discharge from the reactor up to millions of years. In order to allow predictions of the migration of the actinides in the ground, the chemical behavior of these elements in groundwater under environmental conditions and their interactions with geologic media must be studied in detail. In this paper, studies of the sorption of americium (trivalent) and neptunium (pentavalent under oxic conditions) on some major rock-forming minerals of igneous rocks and accessory minerals are reported. (ERA citation 05:020155)

CONF-791118-8 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Fission Product Release from Defected LWR Fuel Rods.
A. P. Malinauskas, R. A. Lorenz, and J. L. Collins. 1979, 16p
Contract W-7405-ENG-26
Water reactor safety research information meeting, Gaithersburg, MD, USA, 5 Nov 1979.

Experiments conducted at Oak Ridge National Laboratory both with fission product simulants and with irradiated commercial fuel have been utilized to develop a semi-empirical model of fission product release from defected Light Water Reactor (LWR) fuel rods. At fuel temperatures less than 1200 exp 0 C, releases occur from fission products previously accumulated in the pellet-to-cladding gap region. In this temperature range, the release of species of moderate volatility is postulated to result from two processes. The first of these, which occurs during the period of fuel clad rupture, is due to the transport of the fill and fission product gases as they are vented through the cladding defect. The second mechanism for release, which is time-dependent, involves the diffusional transport of the semi-volatile species to the point of clad rupture through the interconnected voids (the pellet-to-cladding gap and cracks in fuel pellets) within the fuel rod. (ERA citation 05:020596)

CONF-800403-32 PC **A02**/MF **A01**
Idaho National Engineering Lab., Idaho Falls.
Fission Gas Release in LWR Fuel Measured During Nuclear Operation.
A. D. Appelhans, E. Skattum, and D. J. Osetek. 1980, 8p
Contract EY-76-C-07-1570
ANS thermal reactor safety meeting, Knoxville, TN, USA, 8 Apr 1980.

A series of fuel behavior experiments are being conducted in the Heavy Boiling Water Reactor in Halden, Norway, to measure the release of Xe, Kr, and I fission products from typical light water reactor design fuel pellets. Helium gas is used to sweep the Xe and Kr fission gases out of two of the instrumented Fuel Assembly 430 fuel rods and to a gamma spectrometer. The measurements of Xe and Kr are made during nuclear operation at steady state power, and for exp 135 I following reactor scram. The first experiments were conducted at a burnup of 3000 MWd/t UO sub 2 , at bulk average fuel temperatures of approx. 850 K and approx. 23 kW/m rod power. The measured release-to-birth ratios (R/B) of Xe and Kr are of the same magnitude as those observed in small UO sub 2 specimen experiments, when normalized to the estimated fuel surface-to-volume ratio. Preliminary analysis indicates that the release-to-birth ratios can be calculated, using diffusion coefficients determined from small specimen data, to within a factor of approx. 2 for the IFA-430 fuel. The release rate of exp 135 I is shown to be approximately equal to that of exp 135 Xe. (ERA citation 05:020597)

CONF-800427-4 MF **A01**
Oak Ridge National Lab., TN.
Tritium Monitoring in the GCFR Sweep Gas Fuel Irradiation Capsule BG-10.
U. Gat, M. E. Pruitt, A. W. Longest, and B. D. Epstein. 1980, 18p
Contract W-7405-ENG-26
Tritium technology in fission, fusion, and isotopic application, Dayton, OH, USA, 29 Apr 1980.
Microfiche copies only.

The release of tritium and its transport pathways were studied in a vented, pressure-equalized fuel rod which simulated a fuel rod in a Gas-Cooled Fast Reactor (GCFR). The purpose was to determine the fraction of total tritium production transported via the various pathways and to determine

its chemical form (tritiated hydrogen or water). It was concluded that the fuel rod and its effluent venting lines retained low concentrations of HT (or T sub 2) and any HTO (or T sub 2 O) present. However, the addition of 1% hydrogen to the helium carrier gas quantitatively eluted the tritium from the charcoal trap integral to the fuel rod and from the effluent lines. The chemical composition of the tritium arriving at the monitoring system could be determined by means of converters which convert HT to HTO and vice versa. Ht was the dominant species in the samples measured. (ERA citation 05:022396)

CONF-800444-1 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Overall Assessment of Actinide Partitioning and Transmutation for Waste Management Purposes.
J. O. Blomeke, A. G. Croff, B. C. Finney, and D. W. Tedder. 1980, 21p
Contract W-7405-ENG-26
Technical meeting on the nuclear transmutation of actinides, Ispra, Italy, 21 Apr 1980.

A program to establish the technical feasibility and incentives for partitioning (i.e., recovering) actinides from fuel cycle wastes and then transmuting them in power reactors to shorter-lived or stable nuclides has recently been concluded at the Oak Ridge National Laboratory. The feasibility was established by experimentally investigating the reduction that can be practicably achieved in the actinide content of the wastes sent to a geologic repository, and the incentives for implementing this concept were defined by determining the incremental costs, risks, and benefits. Eight US Department of Energy laboratories and three private companies participated in the program over its 3-year duration. A reference fuel cycle was chosen based on a self-generated plutonium recycle PWR, and chemical flowsheets based on solvent extraction and ion-exchange techniques were generated that have the potential to reduce actinides in fuel fabrication and reprocessing plant wastes to less than 0.25% of those in the spent fuel. Waste treatment facilities utilizing these flowsheets were designed conceptually, and their costs were estimated. Finally, the short-term (contemporary) risks from fuel cycle operations and long-term (future) risks from deep geologic disposal of the wastes were estimated for cases with and without partitioning and transmutation. It was concluded that, while both actinide partitioning from wastes and transmutation in power reactors appear to be feasible using currently identified and studied technology, implementation of this concept cannot be justified because of the small long-term benefits and substantially increased costs of the concept. (ERA citation 05:020131)

CONF-800447-1 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Biological Denitrification of High-Nitrates Wastes Generated in the Nuclear Industry.
C. W. Francis. 1980, 21p
Contract W-7405-ENG-26
Water Research Centre and University of Manchester Institute of Science and Technology conference, Manchester, UK, 15 Apr 1980.

Biological denitrification appears to be one of the most effective methods to remove nitrates from wastewater streams (Christenson and Harremoes, 1975). However, most of the research and development work has been centered on removal of nitrates from sewage or agricultural drainage waters, nitrate nitrogen concentration usually less than 50 g/m exp 3 . Work was initiated at Oak Ridge National Laboratory (ORNL) in 1974 to test the use of biological nitrification in the removal of high concentrations of nitrate (in excess of 1.0 kg NO sub 3 -N/m exp 3) from uranium purification waste streams. Since then, a full-scale treatment facility, a stirred reactor, has been installed at the Y-12 plant; and a pilot-plant, using a fluidized bed, has been proposed at Portsmouth Gaseous Diffusion Plant. The objective of this manuscript is to present some applied microbiological research relating to possible constraints in biologically denitrifying certain waste streams in the nuclear industry and comparing the effectiveness of denitrification of these waste streams in three bench scale reactors, (1) a continuous flow-stirred reactor, (2) stirred bed rector, and (3) a fluidized bed reactor. (ERA citation 05:020132)

CONF-800607-27 PC **A02**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Department of Energy Low-Level Waste Management Strategy.
1980, 2p
Contract EY-76-C-07-1570
American Nuclear Society annual meeting, Las Vegas, NV, USA, 8 Jun 1980.

The DOE strategy recognizes that public perception of low-level waste management practices is not positive. Actions are included that are aimed at opening the system to the public. A better informed public will be able to better assess the performance of the low-level waste management system. (ERA citation 05:020133)

CONF-800607-6 PC **A02**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Long-Term Subsurface Migration of Radionuclides from Buried INEL Transuranic Waste.
T. G. Humphrey, and T. H. Smith. 1980, 12p
Contract EY-76-C-07-1570
American Nuclear Society annual meeting, Las Vegas, NV, USA, 8 Jun 1980.

Studies have been conducted to project long-term subsurface migration of radionuclides from transuranic (TRU-contaminated solid waste buried at the Idaho National Engineering Laboratory (INEL). Projections are given for several conceptual methods of waste confinement. (ERA citation 05:020157)

CONF-800611-1 PC **A02**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Management of alpha-Contaminated Wastes at the Radioactive Waste Management Complex at the Idaho National Engineering Laboratory.
M. A. McCormack. 1980, 3p
Contract EY-76-C-07-1570
International symposium on the management of alpha-contaminated wastes, Vienna, Austria, 2 Jun 1980.

Problems related to above ground storage of radioactive wastes at the Idaho National Engineering Laboratory and steps taken to resolve these difficulties are discussed. The quantity of wastes now in storage and the amount forecasted to be in place by 1985 are disclosed. The condition of containers placed for storage between 1954 and 1970 is described. Programs for retrieval and repackaging for shipment to federal repositories are discussed. (ERA citation 05:020158)

DOE/ET/41900-1 PC **A02**/MF **A01**
Atomics International Div., Canoga Park, CA. Energy Systems Group.
Low-Temperature Ceramic Radioactive Waste Form Characteriztion of Supercalcine-Based Monazite-Cement Composites.
D. M. Roy, L. D. Wakeley, and S. D. Atkinson. 18 Apr 80, 21p
Contract AC09-79ET41900

Simulated radioactive waste solidification by a lower temperature ceramic (cement) process is being investigated. The monazite component (simulated by NdPO sub 4) of supercalcine-ceramic has been solidified in cement and found to generate a solid form with low leachability. Several types of commercial cements and modifications thereof were used. No detectable release of Nd or P was found through characterizing the products of accelerated hydrothermal leaching at 473 exp 0 K (200 exp 0 C) and 30.4 MPa (300 bars) pressure. (ERA citation 05:021888)

DOE/NE-0007 PC **A99**/MF **A01**
Nuclear Regulatory Commission, Washington, DC.
Statement of Position of the United States Department of Energy in the Matter of Proposed Rulemaking on the Storage and Disposal of Nuclear Waste (Waste Confidence Rulemaking).
15 Apr 80, 749p

Purpose of this proceeding is to assess generically the degree of assurance that the radioactive waste can be safely disposed of, to determine when such disposal or off-site storage will be available, and to determine whether wastes can be safely stored on-site past license expiration until off-site disposal/storage is available. (ERA citation 05:020159)

DP-MS-79-103 PC **A02**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Vitrification of SRP Waste by a Slurry-Fed Ceramic Melter.
G. G. Wicks. 1980, 20p CONF-800460-2
Contract EY-76-C-09-0001
82. annual American Ceramic Society meeting, Chicago, IL, USA, 27 Apr 1980.

Savannah River Plant (SRP) high-level waste (HLW) can be vitrified by feeding a slurry, instead of a calcine, to a joule-heated ceramic melter. Potential advantages of slurry feeding include (1) use of simpler equipment, (2) elimination of handling easily dispersed radioactive powder, (3) simpler process control, (4) effective mixing, (5) reduced off-gas volume, and (6) cost savings. Assessment of advantages and disadvantages of slurry feeding along with experimental studies indicate that slurry feeding is a promising way of vitrifying waste. (ERA citation 05:021889)

DP-MS-79-92 PC **A03**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Characterization of off-Gases from a Small-Scale, Joule-Heated Ceramic Melter for Nuclear Waste Vitrification.
G. B. Woolsey, and E. L. Wilhite. 1980, 30p
CONF-800460-1
Contract EY-76-C-09-0001
82. annual American Ceramic Society meeting, Chicago, IL, USA, 27 Apr 1980.

This paper confirmed with actual nuclear waste the thermodynamic predictions of the fate of some of the semivolatiles in off-gas. Ruthenium behaves erratically and it is postulated that it migrates as a finely divided solid, rather than as a volatile oxide. Provisions for handling these waste off-gasses will be incorporated in the design of facilities for vitrifying SRP waste. (ERA citation 05:020142)

EGG-2017 PC **A03**/MF **A01**
Idaho National Engineering Lab., Idaho Falls.
SPI Project Criticality Task Force Initial Review and Assessment.
K. B. McKinley, J. W. Cannon, R. S. Marsden, and H. A. Worle. Mar 80, 45p
Contract EY-76-C-07-1570

The Slagging Pyrolysis Incinerator (SPI) Facility is being developed to process transuranic waste stored and buried at the Idaho National Engineering Laboratory (INEL) into a chemically inert, physically stable, basalt-like residue acceptable for a Federal Repository. A task force was established by the SPI Project Division to review and assess all aspects of criticality safety for the SPI Facility. This document presents the initial review, evaluations, and recommendations of the task force and includes the following: background information on waste characterization, and criticality control approaches and philosophies, a description of the SPI Facility Waste Processing Building, a review and assessment of potentially relevant codes and regulations; a review and assessment of the present state of criticality and assaying/monitoring studies, and recommendations for changes in and additions to these studies. The review and assessment of potentially relevant codes and regulations indicate that ERDAM 0530, Nuclear Criticality Safety should be the controlling document for criticality safety for the SPI Project. In general, the criticality control approaches and philosophies for the SPI Project comply with this document. (ERA citation 05:020143)

ENICO-1032 PC **A03**/MF **A01**
Exxon Nuclear Idaho Co., Inc., Idaho Falls.
Description of a Pilot Plant to Produce a Pelleted Form from Simulated ICPP High-Level Calcined Wastes.
S. J. Priebe, and J. H. Valentine. Mar 80, 44p
Contract AC07-79ID01675

The pilot plant uses techniques learned in the laboratory to combine calcine with solid and liquid binders to form hard, leach-resistant pellets. The pilot plant is designed to process up to 25 kg/h of calcine and will provide information necessary to verify the operational feasibility of pelletizing calcined waste. Also, information for the design of a possible full-scale pelletizing plant will be obtained.

All components of the pelletizing operations are described. The solids feed system consists of two loss-in-weight feeders: one for calcine and one for solid binders. Intimate mixing of the solids is accomplished in a screw mixer-feeder. A metering pump is used to pump liquid binders to the pelletizer through a spray nozzle. A 12.7 mm mesh, vibro screen separator removes oversize pellets, leaving the pelletizer. A 0-6 kW microwave-heated dryer operating at 150 to 200 exp 0 C removes moisture from the pellets in about 15 minutes. To impart leach resistance, the pellets are heat treated at 800 to 900 exp 0 C for 1 to 2 hrs in a kiln. Pellets move down through a set of 6 to 8 stacked, rotating trays inside the kiln. Pellets are collected from the heat treater and tested for strength and leach resistance. An off-gas system cools and removes dust present in the off-gas from the pilot plant. 20 figures. (ERA citation 05:020145)

ENICO-1033 PC **A08**/MF **A01**
Exxon Nuclear Idaho Co., Inc., Idaho Falls.
Technical Quarterly Progress Report, July 1-September 30, 1979.
D. L. Plung. Mar 80, 152p
Contract AC07-79ID01675

Results are reported on the long-term waste management of ICPP high-level wastes, plant process improvement, waste management development, technical support to the NWCF, effluent monitoring methods evaluation and development, and technical program improvement. Presented are results on post-calcination of high-level wastes, uranium accountability development, fluorinel calcination flowsheet development, development of a continuous alpha monitor and results on process evaluation and monitoring. In addition, results of work on the Idaho Programmatic Environmental Impact Statement and on the evaluation of HEPA filter test methods are presented. In the krypton-85 storage development program, results are reported on krypton zeolite encapsulation and on krypton storage development. This work includes a conceptual design and cost estimate for a commercial-scale krypton encapsulation facility. Results of work on the nuclear materials security program are reported; this includes work on materials control test and evaluation system and on portable mass spectrometer development. Other results reported include work on the reactor source term program, burnup methods for fast breeder reactor fuels, absolute thermal fission yields and specialized fuel research - analytical support. Results from research on analytical methods include results on flame atomic absorption spectrophotometry and the analysis of phosphorous by a new colorimetric procedure. In addition, results from work on OKLO studies are reported. (ERA citation 05:021881)

JAB-00099-128 PC **A04**/MF **A01**
URS/John A. Blume and Associates, Engineers, San Francisco, CA.
Considerations for Developing Seismic Design Criteria for Nuclear Waste Storage Repositories.
G. N. Owen, P. I. Yanev, and R. E. Scholl. Apr 80, 73p
Contract AC08-76DP00099

The function of seismic design criteria is to reduce the potential for hazards that may arise during various stages of the repository life. During the operational phase, the major concern is with the possible effects of earthquakes on surface facilities, underground facilities, and equipment. During the decommissioned phase, the major concern is with the potential effects of earthquakes on the geologic formation, which may result in a reduction in isolation capacity. Existing standards and guides or criteria used for the static and seismic design of licensed nuclear facilities were reviewed and evaluated for their applicability to repository design. This report is directed mainly toward the development of seismic design criteria for the underground structures of repositories. An initial step in the development of seismic design criteria for the underground structures of repositories is the development of performance criteria, or minimum standards of acceptable behavior. A number of possible damage modes are identified for the operating phase of the repository; however, no damage modes are foreseen that would perturb the long-term function of the repository, except for the possibility of increased permeability within the rock mass. Subsequent steps in formulating acceptable seismic design criteria for the underground structures involve the quantification of the design process. The report discusses the necessity of specifying the form of ground motion that would be needed for seismic analysis and the procedures that may be used for making ground motion predictions. Further discussions outline what is needed for analysis, including rock properties, failure criteria, modeling techniques, seismic hardening criteria for the host rock mass, and probabilistic considerations. (ERA citation 05:021895)

K/C-1383 PC **A02**/MF **A01**
Oak Ridge Gaseous Diffusion Plant, TN.
Waste Oil Disposal at the Department of Energy Facilities at Oak Ridge, Tennessee.
J. R. Jones, M. E. Mitchell, T. W. Oakes, M. Stroud, D. D. Sanders, and M. B. Tate. 22 Apr 80, 9p
Contract W-7405-ENG-26

The disposal of waste oil generated at the USDOE facilities in Oak Ridge has become a significant problem in recent years. The presence of radioactivity and other contaminants in some oils prohibits the use of commercial disposal and oil reclamation firms, and thus, often necessitates on-site disposal. Recent and proposed federal regulations have and will continue to control all waste oil disposal operations, including those of the Department of Energy. In order to ensure adequate and acceptable disposal of waste oils, a special committee of UCC-ND personnel located in Oak Ridge was established in December 1978 and asked to make appropriate recommendations for both near-term and long-range operations. Included in this paper is a brief description of the efforts of the committee, the associated efforts of development and engineering personnel, and conclusions and recommendations pertaining to UCC-ND waste oil disposal. (ERA citation 05:020146)

ONWI-19(Rev.1) PC **A07**/MF **A01**
Batelle Project Management Div., Columbus, OH. Office of Nuclear Waste Isolation.
National Waste Terminal Storage Program. Office of Nuclear Waste Isolation Technical Program Plan.
Dec 79, 131p
Contract EY-76-C-06-1830

The National Waste Terminal Storage Program (NWTS) was established in 1976 with the objective of developing a system for the permanent isolation of nuclear wastes. DOE is charged with developing programs for the long term management of highly radioactive nuclear wastes by federal law. This legislation specifies that DOE must provide facilities for the successful isolation of these wastes from the biosphere in federally licensed and owned repositories for as long as they represent a significant hazard. The scope of NWTS activities includes providing the technology and facilities for the terminal isolation of commercial wastes by disposal in stable geologic repositories deep underground. Steps leading to the accomplishment of this purpose include: site exploration, characterization, and recommendation; design, licensing, construction, and operation of a geologic repository (or repositories); provision of spent fuel packaging and transportation facilities; technology to support these steps; and coordination of studies of alternate disposal concepts (i.e., deep hole, seabed, space, etc.). Emphasis is being placed on a system of multiple barriers - natural and man-made - to isolate nuclear waste from the environment. Because the nature of the host rock is basic to determination of other barriers, work in the geologic aspects of the multiple barrier system is well under way in several candidate media. Throughout the process, the NWTS Program has the responsibility to provide public information on all aspects of the program and to encourage public interaction. (ERA citation 05:020165)

ONWI-39(V.1) PC **A03**/MF **A01**
Bechtel National, Inc., San Francisco, CA.
Assessment of LWR Spent Fuel Disposal Options. Volume 1. Summary and Conclusions.
Jul 79, 36p
Contract EY-76-C-06-1830

The study identifies several spent fuel waste forms as well as the high level waste (HLW) and other waste forms from fuel reprocessing, defines facility and system design features to handle, transport, process, encapsulate, and dispose of these spent fuel and waste forms, and provides a comparative assessment of each of the spent fuel/waste alternatives with respect to technical feasibility, safeguards, criticality, radiological impact, retrievability, and economics. This volume provides the reader with a general overview of the study, coupled with the specific conclusions developed from the comparative assessments of the study cases and study variations. (ERA citation 05:020124)

ONWI-39(V.2) PC **A10**/MF **A01**
Bechtel National, Inc., San Francisco, CA.
Assessment of LWR Spent Fuel Disposal Options. Volume 2. System Definition and Assessments. Technical Report.
Jul 79, 211p
Contract EY-76-C-06-1830

Volume 2, in addition to introducing and defining the requirements for the study, contains the detailed evaluation of the study cases in each of six assessment areas, and describes and evaluates a number of study variations. (ERA citation 05:020166)

ONWI-39(V.3) PC **A20**/MF **A01**
Bechtel National, Inc., San Francisco, CA.
Assessment of LWR Spent Fuel Disposal Options. Volume 3. Study Bases and System Design Considerations (Appendices). Technical Report.
Jul 79, 462p
Contract EY-76-C-06-1830

Volume 3 (Appendices) provides a tabulation of the bases and assumptions used in the study as well as preconceptual design description and cost estimates of the facilities and transportation systems necessary to implement the various study cases. (ERA citation 05:020167)

ONWI-59 PC **A04**/MF **A01**
Battelle Project Management Div., Columbus, OH. Office of Nuclear Waste Isolation.
Disposal of Spent Nuclear Fuel.
Dec 79, 72p
Contract EY-76-C-06-1830

This report addresses the topic of the mined geologic disposal of spent nuclear fuel from Pressurized Water Reactors (PWR) and Boiling Water Reactors (BWR). Although some fuel processing options are identified, most of the information in this report relates to the isolation of spent fuel in the form it is removed from the reactor. The characteristics of the waste management system and research which relate to spent fuel isolation are discussed. The differences between spent fuel and processed HLW which impact the waste isolation system are defined and evaluated for the nature and extent of that impact. What is known and what needs to be determined about spent fuel as a waste form to design a viable waste isolation system is presented. Other waste forms and programs such as geologic exploration, site characterization and licensing which are generic to all waste forms are also discussed. R and D is being carried out to establish the technical information to develop the methods used for disposal of spent fuel. All evidence to date indicates that there is no reason, based on safety considerations, that spent fuel should not be disposed of as a waste. (ERA citation 05:020168)

ONWI-87 PC **A08**/MF **A01**
Battelle Project Management Div., Columbus, OH. Office of Nuclear Waste Isolation.
Consultation and Concurrence: Workshop Proceedings, September 23-26, 1979, the Orcas Meeting, Eastsound, Washington.
Jan 80, 159p
Contract EY-76-C-06-1830

Purpose of the workshop was to probe the concepts of consultation and concurrence and to address issues in establishing and maintaining an effective state-federal process in nuclear waste management. The workshop was a gathering of some 50 people from industry, the environmental movement, local government, executive and legislative branches of state government, US Congres-

sional staffs, the US Department of Energy, Nuclear Regulatory Commission, ONWI, university social science departments, and other research institutions. The workshop consisted of general sessions at which ten papers covering various aspects of consultation and concurrence were presented and of working groups which further explored issues raised by the papers. This report presents a general summary of discussions, the text of a background paper prepared for the workshop, the presented papers, and individual comments by several participants. (ERA citation 05:020135)

PNL-SA-7953 MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Nature of Glass Leaching.
G. L. McVay, and C. Q. Buckwalter. Jul 79, 40p CONF-7909102-2
Contract EY-76-C-06-1830
Argonne specialists' workshop on basic research needs for nuclear waste management, Argonne, iL, USA, 5 Sep 1979.
Microfiche copies only.

Several models have been proposed in the literature to describe glass leaching behavior in aqueous solutions, but they are primarily applicable to relatively simple glasses. Their shortcoming is that they do not incorporate enough of the phenomena occurring during leaching. Leaching characteristics of a complex waste containment glass are discussed. Gamma irradiation increases the leach rates. Since bulk diffusion does not play a major role in leaching, the existing models are totally indequate for complex glasses. 4 figures, 3 tables. (ERA citation 05:020175)

PNL-3160-3 PC **A11**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Variable Thickness Transient Ground-Water Flow Model. Volume 3. Program Listings.
A. E. Reisenauer. Dec 79, 236p
Contract EY-76-C-06-1830

The Assessment of Effectiveness of Geologic Isolation Systems (AEGIS) Program is developing and applying the methodology for assessing the far-field, long-term post-closure safety of deep geologic nuclear waste repositories. AEGIS is being performed by Pacific Northwest Laboratory (PNL) under contract with the Office of Nuclear Waste Isolation (OWNI) for the Department of Energy (DOE). One task within AEGIS is the development of methodology for analysis of the consequences (water pathway) from loss of repository containment as defined by various release scenarios. Analysis of the long-term, far-field consequences of release scenarios requires the application of numerical codes which simulate the hydrologic systems, model the transport of released radionuclides through the hydrologic systems to the biosphere, and, where applicable, assess the radiological dose to humans. Hydrologic and transport models are available at several levels of complexity or sophistication. Model selection and use are determined by the quantity and quality of input data. Model development under AEGIS and related programs provides three levels of hydrologic models, two levels of transport models, and one level of dose models (with several separate models). This is the third of 3 volumes of the description of the VTT (Variable Thickness Transient) Groundwater Hydrologic Model - second level (intermediate complexity) two-dimensional saturated groundwater flow. (ERA citation 05:020173)

PNL-3333 PC **A06**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Summary of Non-US National and International Radioactive Waste Management Programs 1980.
K. M. Harmon, J. A. Kelman, L. A. Stout, and K. A. Hsieh. Mar 80, 110p
Contract EY-76-C-06-1830

Many nations and international agencies are working to develop improved technology and industrial capability for nuclear fuel cycle and waste management operations. The effort in some countries is limited to research in university laboratories on treating low-level waste from reactor plant operations. In other countries, national nuclear research institutes are engaged in major programs in all phases of the fuel cycle and waste management, and there is a national effort to commercialize fuel cycle operations. Since late 1976, staff members of Pacific Northwest Laboratory have been working under US Department of Energy sponsorship to assemble and consolidate openly available information on foreign and international nuclear waste management programs and technology. This report summarizes the information collected on the status of fuel cycle and waste management programs in selected countries making major efforts in these fields as of the end of January 1980. (ERA citation 05:021902)

RHO-CD-394 PC **A02**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Double Shell Slurry Process Test Evaluation.
J. O, Honeyman, and M. Solbakken. Apr 78, 25p
Contract EY-77-C-06-1030

This report discusses results of a plant demonstration of the double shell slurry process which was conducted April 25 to 28, 1977. 274,000 gallons of double shell slurry were produced from 365,000 gallons of Hanford Defense Residual Liquor. The volume reduction was 25%. Process control was maintained near the proper zone in the early part of the run. However, the feed was underconcentrated in the latter part of the run. Hydroxide concentrations of the product samples ranged from 2.1 to 5.9 M. The aluminum to caustic ratio varied from 0.33 to 1.07. The solids were primarily sodium nitrate, carbonate, aluminate, and nitrate. All samples were totally water soluble. The double shell slurry product increased in volume by 19,000 gallons from April to October 1977, probably caused by organic chelating agents. (ERA citation 05:020148)

RHO-SA-148 PC **A02**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Use of a Decommissioning Cost/Risk/Benefit Analysis to Identify Beneficial Design Features.
R. A. Sexton. 1980, 6p CONF-800359-1
Contract EY-77-C-06-1030
NEA specialist meeting on decommissioning requirements in the design of nuclear facilities, Paris, France, 17 Mar 1980.

A Cost/Risk/Benefit Analysis on the future decommissioning of the Hanford Z-Plant, a plutonium conversion and fabrication facility in the United States, was recently completed. The analysis has been used to identify decommissioning tasks high in cost of occupational radiation exposure. Recommendations for future design considerations have been made. They include ways of easing glove box removal, reducing piping removal requirements, and simplifying decontamination of structural surfaces. (ERA citation 05:020138)

RHO-SA-51 MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Removal of Radionuclides from Hanford Defense Waste Solutions.
W. W. Schutz. Jan 80, 82p CONF-800607-30
Contract EY-77-C-06-1030
American Nuclear Society annual meeting, Las Vegas, NV, USA, 8 Jun 1980.
Microfiche copies only.

The Hanford high-level defense wastes were characterized by their large volume (190,000 m exp 3) and varying content of inert and radioactive constituents. The water-soluble portion (140,000 m exp 3) of these wastes, which consists mainly of NaNO sub 3 , NaAl(OH) sub 4 , Na sub 2 CO sub 3 and other sodium salts, contains a few milligrams of long-lived (t/sub 1/2/ greater than or equal to 10 years) radionuclides per 1000 kilograms. There is probable economic incentive for long-term management of Hanford defense wastes to partition them into a small volume of highly radioactive material requiring high integrity immobilization and storage and a much larger fraction of low level (e.g., < 10 nCi/g) waste which can be economically and safely stored in bulk form. To aid in achieving this latter objective, an integrated series of aqueous separations processes (precipitation, ion exchange, and solvent extraction methods) was designed to remove exp 137 Cs, exp 90 Sr, actinides, other multivalent cationic fission and activation products, and exp 99 Tc from the water-soluble wastes. Results of generally satisfactory laboratory-scale tests of radionuclide removal technology with actual Hanford wastes are described. (ERA citation 05:020149)

RHO-SA-98 PC **A03**/MF **A01**
Atomics International Div., Richland, WA. Rockwell Hanford Operations.
Ozonation of Hanford Nuclear Defense Waste.
T. W. Lutton, W. W. Schulz, D. M. Strachan, and L. J. Bollyky. Mar 80, 27p CONF-791182-1
Contract EY-77-C-06-1030
International ozone conference, Houston, TX, USA, 26 Nov 1979.

High (e.g., 0.1 to 0.5M) concentrations of ethylenediaminetetraacetate (EDTA), 2-hydroxyethylethylenediaminetriacetate (HEDTA), and other organic complexing agents are present in some of the nuclear waste solutions currently stored at the US Department of Energy Hanford Site in southeastern Washington State. Ozonolysis of these alkaline solutions smoothly and efficiently destroys the organic material thereby facilitating ion exchange removal of exp 90 Sr and other long-lived cationic radionuclides. Successful bench-scale ozonation tests have been performed with both synthetic and actual waste liquids. (ERA citation 05:020150)

SAND-79-1665 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Thermal Conductivity of Rocksalt and Other Geologic Materials from the Site of the Proposed Waste Isolation Pilot Plant.
J. N. Sweet, and J. E. McCreight. 19 Mar 80, 33p
Contract EY-76-C-04-0789

The measurements first reported by Acton on the thermal conductivity of samples taken from a borehole at the site of the proposed nuclear waste isolation pilot plant (WIPP) near Carlsbad, NM, have been extended to include additional samples and higher temperature measurements. Samples for measurements were taken from several depths of three wells, including the well AEC 8 from which Acton obtained his samples. These samples ranged from relatively pure rocksalt (NaCl) with small amounts of interstitial anhydrite to essentially nonsalt samples composed of gypsum or clay. The measurements in this latest series were conducted at Sandia, the Los Alamos Scientific Laboratory (LASL), and at Dynatech Corp. In general, the data from the three laboratories agreed reasonably well for similar coarse grained translucent rock salt samples, with the LASL and Sandia results typically being about 20% higher than those of Dynatceh. On the basis of these experiments, it is concluded that the thermal conductivity of materials found at the site can be predicted to an accuracy +-30% from knowledge of the composition and grain size of these materials. (ERA citation 05:020181)

SAND-79-2216A PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Degradation of Transuranic-Contaminated Wastes under Geologic Isolation Conditions.
M. A. Molecke. Nov 79, 3p CONF-800611-2
Contract EY-76-C-04-0789
International symposium on the management of alpha-contaminated wastes, Vienna, Austria, 2 Jun 1980.

An extensive experimental study of the degradation of existing forms of defense-related, transuranic-contaminated (TRU) wastes is being conducted by and for Sandia Laboratories. Studies have been performed under environmental conditions expected for deep geologic isolation in the Waste Isolation Pilot Plant (WIPP), a bedded-salt TRU waste repository planned for southeastern New Mexico. A primary purpose of this program has been to support the US Department of Energy in establishing waste acceptance criteria for TRU wastes for isolation in the WIPP. TRU waste forms investigated include cellulosics (paper, rags, wood), plastics, rubbers, mixed organic composite, bitumen, a developmental concrete-TRU ash matrix, mild steel, and inorganic process sludges. This review includes laboratory and field results for waste degradation under a range of conditions, resultant gas generation rates, gas compositions, corrosion rates, and microbial formation and degradation of chelating agents. (ERA citation 05:020184)

SAND-79-2245C PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Strategy for Assessing the Technical, Environmental, and Engineering Feasibility of Subseabed Disposal.
D. R. Anderson, D. G. Boyer, H. Herrmann, J. Kelly, and D. M. Talbert. 1980, 32p CONF-800420-2
Contract EY-76-C-04-0789
International ocean disposal symposium, Woods Hole, MA, USA, 15 Apr 1980.

This paper presents the strategy and management techniques used in the development of the US Subseabed Disposal Program (SDP) for possible disposal of both high-level waste and spent fuel. These have been developed through joint efforts of the Department of Energy (DOE), Division of Waste Isolation, the Sandia Technical Program Manager, the Technical Program Coordinators, the Advisory Group, and the Principal Investigators. Three subsections of this paper address the various components which make up the SDP strategy and management techniques. The first section will summarize the US DOE high-level waste and spent fuel disposal program and the position that the SDP occupies within that program. The second section, the Subseabed Program Plan, addresses the technical and administrative tools which are employed to facilitate the day-to-day operation of the SDP. The third section addresses the current studies and future plans for addressing the legal, political, and international uncertainties that must be resolved prior to the time the SDP reaches the final engineering phases. (ERA citation 05:020186)

SAND-80-0390C MF **A01**
Sandia Labs., Albuquerque, NM.
Sandia Borehole Plugging Program for the Waste Isolation Pilot Plant (WIPP).
C. L. Christensen. 1980, 30p CONF-800527-1
Contract EY-76-C-04-0789
International BHP symposium, Columbus, OH, USA, 7 May 1980.
Microfiche copies only.

This paper presents the current Borehole Plugging Program (BHP) at Sandia National Laboratories and addresses the four major functional tasks considered necessary for a successful program: (1) project management, including methods to identify, design, and control needed experimentation; (2) identification of candidate materials, emphasizing cement-based products as the most advanced alternatives due to the extensive existing technology base, but recognizing the potential application of alternate materials; (3) development of test instrumentation based on utilization of existing techniques, evaluation of their adequacy, and identifying modifications necessary to improve effectiveness; (4) field test program, which includes testing and verification of plug performance. The scope of the current program on wellbores, cementitious grouts, and available technology is compared to planned extension to shafts and drifts, alternate materials, and improved instrumentation. The relationship of this program with assessments of long-term suitability performed in the geochemical program is presented. A brief presentation of current and planned field tests is given along with projections for future activities and results. (ERA citation 05:020189)

UCRL-15217 PC **A04**/MF **A01**
Analytic Sciences Corp., Reading, MA.
Example of Monte Carlo Analysis Applied to Repository Siting.
M. S. Giuffre, and M. F. Kaplan. 31 Aug 79, 54p
Contract W-7405-ENG-48

This report contains a detailed description of a Monte Carlo analysis of a hypothetical nuclear waste repository performed for the Lawrence Livermore Laboratory as part of their mock siting exercise. Field measurements had been used to construct a hydrology model of the geologic medium surrounding a nuclear waste repository, complete with specified uncertainties. The Monte Carlo analysis has been used to ascertain the uncertainty in the radioactive release from the repository given the uncertainty in the geohydrologic parameters, and correlation analysis has identified some input parameters that have a potentially large influence on the output (radioactivity release) uncertainty. (ERA citation 05:020192)

UCRL-83976 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Test Storage of Spent Reactor Fuel in the Climax Granite at the Nevada Test Site.
L. D. Ramspott, and L. B. Ballou. 13 Feb 80, 17p CONF-800313-5
Contract W-7405-ENG-48
Waste management conference, Tucson, AZ, USA, 10 Mar 1980.

A test of retrievable dry geologic storage of spent fuel assemblies from an operating commercial nuclear reactor is underway at the Nevada Test Site. This generic test is located 420 m below the surface in the Climax granitic stock. Eleven canisters of spent fuel approximately 2.3 years out of reactor core (about 2 kW/canister thermal output) will be emplaced in a storage drift along with 6 electrical simulator canisters and their effects will be compared. Two adjacent drifts will contain electrical heaters, which will be operated to simulate within the test array the thermal field of a large repository. The test objectives, technical concepts and rationale, and details of the test are stated and discussed. (ERA citation 05:020129)

18H. Radioactivity

CONF-791051-21 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Neutron Spectral Characterization of the NRC-HSST Experiments.
F. W. Stallmann, and F. B. K. Kam. 1979, 19p
Contract W-7405-ENG-26
ASTM-EURATOM symposium on reactor dosimetry, Ispra, Italy, 1 Oct 1979.

Irradiation experiments are being performed for the US Nuclear Regulatory Commission (NRC) Heavy Section Steel Technology (HSST) program. Results of dosimetry performed in the second experiment have been previously reported. Similar procedures were followed in the third experiment. The experiences gained in these two experiments have led to modifications in the composition and distribution of foil dosimeters which monitor the neutron flux-spectra in the irradiated steel specimens. It is expected that in the new experiments much higher accuracies than previously possible can be achieved in the determination of irradiation damage parameters. (ERA citation 05:020642)

DP-1542 PC **A03**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Confinement of Airborne Radioactivity. Final Progress Report, January-December 1978.
Feb 80, 32p
Contract EY-76-C-09-0001

A new test method has been developed at the Savannah River Laboratory for evaluating the iodine retention capabilities of carbon used in the airborne-activity confinement system. Methyl iodide tagged with I-131 is injected into a test gas stream continuously for 5 hours with test conditions of 80 exp 0 C temperature, 95% relative humidity, and 55 feet per minute linear flow velocity. Results show that the CH sub 3 I retention efficiency is independent of the inlet CH sub 3 I concentration over the range of at least 0.9 to 200 mu g/m exp 3 in the test gas stream. The method was also used to evaluate the effects of paint fumes on in-service carbons and showed that solvent exposure reduced carbon service life by 5 to 7 months. Experimental carbons both before and after service exposure in the SRP carbon test facility were also evaluated. (ERA citation 05:020653)

EGG-1183-1759 MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Aerial Radiation Surveys.
J. Jobst. 1980, 11p CONF-800334-8
Contract EY-76-C-08-1183
DOE environmental control symposium, Reston, VA, USA, 17 Mar 1980.
Microfiche copies only.

A recent aerial radiation survey of the surroundings of the Vitro mill in Salt Lake City shows that uranium mill tailings have been removed to many locations outside their original boundary. To date, 52 remote sites have been discovered within a 100 square kilometer aerial survey perimeter surrounding the mill; 9 of these were discovered with the recent aerial survey map. Five additional sites, also discovered by aerial survey, contained uranium ore, milling equipment, or radioactive slag. Because of the success of this survey, plans are being made to extend the aerial survey program to other parts of the Salt Lake valley where diversions of Vitro tailings are also known to exist. (ERA citation 05:021176)

IDO-12082(79) MF **A01**
Idaho National Engineering Lab., Idaho Falls.
1979 Environmental Monitoring Program Report for Idaho National Engineering Laboratory Site.
May 80, 44p
Contract W-7405-ENG-82
Microfiche copies only.

The results of the 1979 environmental monitoring programs have shown the presence of natural radioactivity and worldwide fallout, but showed no INEL-produced radioactivity detected in the offsite environs. Concentrations and doses from radioactive materials discharged during Site operations were of no health consequence to the surrounding populations. Air, water, and foodstuff samples are routinely collected from around the INEL boundary and from locations distant from the INEL Site. This report describes the analyses and comparison of such samples to determine if there has been any contribution from INEL operations. (ERA citation 05:021177)

NUREG/CR-1253 PC **A06**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Methods for Assessing Background Levels of Radiation and Radioactive Materials in the Environment Around Uranium Mills.
N. A. Wogman, W. B. Silker, J. A. Glissmeyer, and G. W. R. Endres. Jun 80, 105p PNL-3256
Contract DE-AC06-76RLO1830

A major concern regarding both existing and proposed sitings of uranium processing mills is their radiological impact on the surrounding unrestricted environment. In order to assess an incremental increase in radioactive background of any property due to mill operations, it is mandatory that natural or background levels of that property be established. This report assesses techniques and costs for determining background levels and mill contributions to the environment above these levels, and three specific programs are identified for the determination of natural background and mill contributions to that background. Methods for the measurement of airborne 222Rn and its daughters, the measurement of airborne radionuclide particulates, and methods for assessing background levels of uranium, thorium, and radium in the environment in the vicinity of uranium mills are presented. These methodologies are organized by their increasing capital and operation costs. Many alternatives to these procedures are discussed to allow flexibility under different conditions.

NUREG/CR-1413 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
A Radionuclide Decay Data Base - Index and Summary Table,
D. C. Kocher. Jun 80, 30p ORNL/NUREG-70
Contract W-7405-eng-26

This report provides an index and summary table for an extensive data base of evaluated radioactive decay data for approximately 500 radionuclides of potential importance in assessing radiological impacts on the general public or occupationally exposed individuals. For each radionuclide, the summary table gives the radionuclide name, half-life, and the average energy per decay for the emitted alpha particles, electrons, and photons.

NUREG-0662-V-1 PC **A06**/MF **A01**
Nuclear Regulatory Commission, Washington, DC. Office of Nuclear Reactor Regulation.
Decontamination of the Three Mile Island Unit 2 Reactor Building Atmosphere (Final Environmental Assessment).
Final staff rept.
May 80, 102p

This final Environmental Assessment evaluates the environmental impacts of alternative methods

for decontaminating the reactor building atmosphere at Three Mile Island, Unit 2 and incorporates comments on decontamination alternatives from Federal, State, and local officials and from private citizens and groups. The staff recommends that the reactor building be purged over a 60-day period.

NUREG-0681 PC **A02**/MF **A01**
Nuclear Regulatory Commission, Washington, DC. Office of Nuclear Reactor Regulation.
Environmental Assessment of Radiological Effluents from Data Gathering and Maintenance Operation on Three Mile Island Unit 2: Interim Criteria Approved by the Commission on April 7,1980.
May 80, 15p

The staff is currently in the process of preparing a programmatic environmental impact statement (PEIS) for TMI-2 which will address all radiological releases that may occur as a result of the cleanup and recovery operations. These operations will begin after the PEIS is published in final form provided the proposed cleanup programs have been found to be environmentally acceptable. In the interim period it is necessary for the licensee to conduct data gathering and maintenance operations on the damaged reactor. The action of approval of these interim operations does not foreclose any of the options of the PEIS. In addition, regardless of what cleanup choice is made in the PEIS, the approval of these data gathering and maintenance operations enhance the ability of the licensee to maintain the reactor in a safe configuration and to plan effectively for recovery operations. This Environmental Impact Appraisal evaluates the effects on the environment of allowing these data gathering and maintenance operations to be conducted. These data gathering and maintenance operations do not include purging of the containment atmosphere, disposal of EPICOR-II water, or the treatment and disposal of high level radioactively contaminated water in the reactor building.

ORNL-5573 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Evaluation of Models Used for the Assessment of Radionuclide Releases to the Environment: Summary of Documentation, April 1976-June 1979.
K. A. Kanak, and C. W. Miller. Apr 80, 70p
Contract W-7405-ENG-26

A project is underway at Oak Ridge National Laboratory (ORNL) to identify models available for environmental radiological assessments; to evaluate model structure simplifying assumptions and data bases; to estimate their uncertainties; and, if possible, to recommend the models and parameters that are best suited to particular assessment situations. When needs are identified, recommendations are also made for further environmental and biomedical research. The purpose of this particular report is to summarize the progress made toward the goals of this project to date. Such progress is reflected in the documents produced by the staff of the project. Therefore, this report presents a compilation of the abstracts and summaries of the Laboratory reports, open literature publications, conference proceedings, and oral presentations prepared under the auspices of this project. A total of thirty-eight different papers are represented in this collection. The models considered in these materials are those developed for the prediction of atmospheric transport and deposition, surface water transport and sorption, terrestrial and aquatic food-chain bioaccumulation, and internal dosimetry. Topics covered in the report include: (1) methods for analyzing models; (2) analysis of model input parameters; (3) model validation studies; (4) assessments of particular nuclides and processes; (5) recommendations concerning models and parameters to be used for assessment purposes; and (6) models and computer codes developed during the course of the project. This report will serve as a guide to the literature for those involved with the use and application of environmental radiation assessment models. (ERA citation 05:021217)

PNL-SA-7511 PC **A02**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Collective Dose Commitments Due to Reported Radioactive Releases from Nuclear Power Plant Sites in 1976.
D. A. Baker, and T. Decker. 1979, 15p CONF-790728-7
Contract EY-76-C-06-1830
24. annual meeting of the Health Physics Society, Philadelphia, PA, USA, 7 Jul 1979.

In a continuation of last year's study, collective radiation dose commitments were estimated for all operating water-cooled nuclear power plant sites, utilizing atmospheric and liquid radioactivity releases reported to the Nuclear Regulatory Commission for 1976. Results are presented of collective dose commitments from these release pathways to four population groups: infant, child, teenager, and adult residing between 2 and 80 km from each site. Typical individual doses were estimated for each site and for all the sites together. The sites were rated as to their power output per unit population dose and per unit average individual dose. Results for 1976 operating reactors indicate a reduction of overall collective dose from those operating in 1975 even though more electrical energy was generated in 1976. (ERA citation 05:021181)

18I. Reactor Engineering and Operation

CEND-379(V.4) PC **A10**/MF **A01**
Combustion Engineering, Inc., Windsor, CT.
Conceptual Design of a Large HWR for US Siting.
N. L. Shapiro, and J. F. Jesick. Sep 79, 206p
Contract EN-77-C-01-5068

Information on PHWR type reactor is presented concerning reactors kinetics; fuel cycle charge and discharge inventory data; and capital cost. (ERA citation 05:020610)

CONF-791008-5 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Ultrasonic Dynamic Imaging (UDI) System to Determine the Size and Velocity of Large Spherical Simulated Bubbles in Liquids.
J. Lattimer, D. W. Fitting, and L. Adler. 1979, 4p
Contract W-7405-ENG-26
ASNT fall conference, St Louis, MO, USA, 15 Oct 1979.

As part of the nuclear safety program it is desirable to fully characterize the dynamics of a vapor bubble formed in liquid sodium. The bubble would be formed during the hypothetical case of partial core vaporization in a liquid-metal reactor. A real-time ultrasonic imaging system was developed which provides simultaneous measurement of the rise velocity and radius of large spherical bubbles. The range of applicability of the UDI system has been determined in model experiments. (ERA citation 05:020655)

CONF-791058-68 MF **A01**
Oak Ridge National Lab., TN.
Use of Thorium in Fast Breeder Reactors.
D. E. Bartine. 1979, 3p
Contract W-7405-ENG-26
International conference on nuclear cross sections for technology, Knoxville, TN, USA, 22 Oct 1979. Microfiche copies only.

Recently several fuel cycles involving thorium have been suggested for use in fast breeder reactors. These cycles involve the use of thorium in fuels containing exp 233 U and fissile plutonium and the use of both internal and conventional thorium blanket elements. Studies were performed in the Engineering Physics Division at ORNL to determine the performance of fast breeder reactors utilizing such cycles. In addition, there is a current effort toward analyzing reaction rates, spectra, and integral measurements of prototypic fast reactor configurtions involving thorium. These experiments were performed at the PROTEUS facility of the EIR laboratory at Wuerenlingen, Switzerland, and at the Tower Shielding Facility at ORNL. The analysis of these experiments provides insight regarding data needs for fast reactor applications involving the thorium cycle. (ERA citation 05:022393)

CONF-791103-77 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Nuclear Heating in Thick Iron Slabs at the ORR Pool Side Facility.
I. I. Siman-Tov. 1979, 5p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

The purpose of this work was to determine experimentally and computationally the nuclear heating rates in iron in the Pool Side Facility (PSF) of the Oak Ridge Research Reactor (ORR). This work was performed in support of the NRC-Pressure Vessel Surveillance Program, the objective of which is to verify and upgrade dosimetry and damage correlations for pressure vessels of Light Water Reactors. (ERA citation 05:020643)

CONF-791103-92 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
SAS3D Analysis of Natural Convection Boiling Behavior in the Sodium Boiling Test Facility.
G. Klein, and F. Dunn. 1979, 6p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

The objective of the initial phase of testing in the Sodium Boiling Test (SBT) Facility, at the Oak Ridge National Laboratory, was to determine the maximum power that could be transferred by a simulated breeder reactor coolant subchannel when the coolant flow is driven by natural convection. In order to aid in the evaluation of the experimental data and to help understand the flow regimes present at the various power levels examined during this test program, a SAS3D computer model of the SBT Facility was developed. (ERA citation 05:020656)

CONF-791103-99 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Development of the Centralized Reliability Data Organization (CREDO).
P. M. Haas, T. F. Bott, H. E. Knee, J. J. Manning, and S. D. Hudson. 1979, 7p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

CREDO has been established to meet the needs of the US Breeder Reactor Program and the advanced reactor community for a centralized source of accurate reliability/maintainability data and data-related services. The center provides for a comprehensive program of collection, evaluation, and dissemination of data and for necessary user services. A steering committee of nationally recognized experts has been formed to guide CREDO development and operation. Historic data have been collected, analyzed, and published. Routine, continuous data collection and processing has been initiated at US sites. Interfaces with existing data bases have been established. Special user services are under development. (ERA citation 05:020613)

CONF-800403-27 PC **A02**/MF **A01**
Idaho National Engineering Lab., Idaho Falls.
Evaluation of the Thermal-Hydraulic Response and Fuel Rod Thermal and Mechanical Deformation Behavior During the Power Burst Facility Test LOC-3.
T. R. Yackle, P. E. MacDonald, and J. M. Broughton. 1980, 8p
Contract EY-76-C-07-1570
ANS thermal reactor safety meeting, Knoxville, TN, USA, 8 Apr 1980.

An evaluation of the results from the LOC-3 nuclear blowdown test conducted in the Power Burst Facility is presented. The test objective was to examine fuel and cladding behavior during a postulated cold leg break accident in a pressurized water reactor (PWR). Separate effects of rod internal pressure and the degree of irradiation were investigated in the four-rod test. Extensive cladding deformation (ballooning) and failure occurred during blowdown. The deformation of the low and high pressure rods was similar; however, the previously irradiated test rod deformed to a greater extent than a similar fresh rod exposed to identical system conditions. (ERA citation 05:020657)

CONF-800403-33 PC **A02**/MF **A01**
Idaho National Engineering Lab., Idaho Falls.

Influence of Gas Pressure and Composition on Fuel Temperature Observed in the USNRC/ Halden Assembly IFA-430.
R. W. Miller, A. D. Appelhans, and S. J. Dagbjartsson. 1980, 8p
Contract EY-76-C-07-1570
ANS thermal reactor safety meeting, Knoxville, TN, USA, 8 Apr 1980.

A series of fuel behavior experiments have been conducted in the Heavy Boiling Water Reactor in Halden, Norway, to assess the effects of fuel rod internal fill gas pressure and composition on fuel temperature. Fill gases composed of He, 90% He/ 10% Xe, and 95% He/5% Xe at pressures from 0.1 to 5.0 MPa, were introduced into two light water reactor (LWR) design fuel rods in the Instrumented Fuel Assembly 430. These two fuel rods are connected to a gas flow system which allows the fill gases to be exchanged during nuclear operation. The two rods are identical in design except for fuel-cladding gap sizes, which are 0.1 and 0.23 mm. (ERA citation 05:020598)

CONF-800434-3 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Behavior of Sodium Oxide, Uranium Oxide and Mixed Sodium Oxide-Uranium Oxide Aerosols in a Large Vessel.
R. E. Adams, J. T. Han, T. S. Kress, and M. Silberberg. 1980, 20p
Contract W-7405-ENG-26
CSNI specialist meeting on nuclear aerosols in reactor safety, Gatlinburg, TN, USA, 15 Apr 1980.

Results are reported for experiments on the behavior of sodium oxide aerosols, uranium oxide aerosols, and various mixtures of these in the Nuclear Safety Pilot Plant (NSPP) vessel at Oak Ridge National Laboratory. The NSPP program, sponsored by the Nuclear Regulatory Commission, is to provide experimental qualification of the HAARM-3 aerosol behavioral code being independently developed at Battelle-Columbus Laboratories. The results of fourteen single-component and six mixed-component aerosol experiments are presented along with selected comparisons with code predictions. (ERA citation 05:020659)

CONF-800607-13 PC **A02**/MF **A01**
Idaho National Engineering Lab., Idaho Falls.
FRAP-T5 Predictions During Reactor Shutdown Events.
G. B. Peeler, and E. T. Laats. 1980, 8p
Contract EY-76-C-07-1570
American Nuclear Society annual meeting, Las Vegas, NV, USA, 8 Jun 1980.

The Transient Fuel Rod Analysis Program, FRAP-T5, was recently assessed by EG and G Idaho, Inc. As part of this assessment, the measured and FRAP-T5 predicted fuel centerline temperature response during reactor shutdown events were compared. For these events either forced convection or nucleate boiling boundary conditions existed, resulting in a negligible effect on fuel behavior from cladding temperature and deformation uncertainties. This allowed the assessment of internal heat transfer to be emphasized. (ERA citation 05:020661)

COO-4711-23 PC **A05**/MF **A01**
Babcock and Wilcox Co., Lynchburg, VA.
Post-Irradiation Examination of Oconee 1 Fuel - Cycle 1 Destructive Test Phase.
Jul 79, 97p BAW-1535
Contract AC02-78ET34212

Standard B and W Mark-B (15 x 15) pressurized water reactor fuel rods were destructively examined after one cycle of irradiation in the Oconee 1 reactor. Fuel rod average burnup ranged from 10,603 to 11,270 MWd/mtU for the rods examined. Data obtained included fuel rod extraction loads, rod dimensional changes, cladding tensile properties, fuel pellet gap length, fission product distribution, fission gas and crud composition, fuel densification, chemical burnup analysis, and fuel and cladding microstructure. As expected, parametric changes were well within the design envelope. Superficial corrosion and wear were found at spacer grid contact points. However, the 19 rods examined were structurally sound and exhibited no indications of cladding defects associated with pellet-cladding interactions. (ERA citation 05:020604)

DOE/TIC-11162 PC **A10**/MF **A01**
Argonne National Lab., IL.
EBR-II Operating Experience.
C. R. F. Smith. Jul 78, 220p
Contract W-31-109-ENG-38

Operation of the EBR-2 reactor is presented concerning the performance of the heat removal system; reactor materials; fuel handling system; sodium purification and sampling system; cover-gas purification; plant diagnostics and instrumentation; recent improvements in identifying fission product sources in EBR-2; and EBR-2 safety. (ERA citation 05:020650)

DOE/TIC-11163 PC **A03**/MF **A01**
Argonne National Lab., IL.
EBR-II Project: Run 100, March 4 1979-April 15, 1979.
1979, 44p
Contract W-31-109-ENG-38

Run 100 started on March 4 and ended on April 15, 1979, following 2139 MWd of reactor operation. Reactor-operate interlocks and reactor-startup checksheets were completed on March 4. Criticality was reached at 2337 on March 4. The control rods were calibrated, and reactor power was increased, reaching 62.5 MWt at 0850 on March 5. Run 100A was to be a 48-hr irradiation of the flow-blockage-simulation experiment (X343). The FERD signal increased linearly with power and reached about 280 counts/s at 62.5 MWt. (ERA citation 05:022430)

DOE/TIC-11164 PC **A03**/MF **A01**
Argonne National Lab., IL.
EBR-II Project: Run 99, January 3, 1979-February 22, 1979.
1979, 49p
Contract W-31-109-ENG-38

Run 99 was started on Jan. 9, 1979, and ended on Feb. 22, 1979, following 2344 MWd of operation. The run was conducted in five segments because of fission-product releases. There were two scrams; one was caused by instrument malfunctions and one was a manual scram due to high FERD counts. (ERA citation 05:022431)

DOE/TIC-11165 PC **A03**/MF **A01**
Argonne National Lab., IL.
EBR-II Project: Run 104, October 7, 1979-December 3, 1979.
1979, 33p
Contract W-31-109-ENG-38

Run 104 started on October 7, 1979, and ended on December 3, 1979, after 3106 MWd of operation. Authorized power level was reduced from 62.5 MWt to 57-1/4 MWt as part of the Operational Safety Testing Program. The run was conducted in two segments because of a fission-product release. Two reactor scrams occurred during the run: one caused by failure of the latch clutch for control rod No. 1, and one caused by a low-flow trip for reactor coolant outlet. (ERA citation 05:022432)

DOE/TIC-11166 PC **A04**/MF **A01**
Argonne National Lab., IL.
EBR-II Project: Run 101, April 16, 1979-June 25, 1979.
1979, 53p
Contract W-31-109-ENG-38

Run 101 started on April 18 and ended on June 25, 1979, after 2436 MWd of operation. The run was conducted in two segments because of a fission-product release. There was one manual scram at the beginning of the run, before full power, because of high FERD count. Between the completion of run 100 on April 16 and the beginning of run 101, annual long-shutdown maintenance and scheduled plant modifications were in progress. (ERA citation 05:022433)

DOE/TIC-11167 PC **A03**/MF **A01**
Argonne National Lab., IL.
EBR-II Project: Run 102, June 25, 1979-August 20, 1979.
1979, 38p
Contract W-31-109-ENG-38

Run 102 started on July 4 and ended on August 20, 1979, following 2513 MWd of reactor operation. (ERA citation 05:022434)

DOE/TIC-11168 MF **A01**
Argonne National Lab., IL.
EBR-II Project: Run 103, August 20, 1979-October 6, 1979.
1979, 36p
Contract W-31-109-ENG-38
Microfiche copies only.

Run 103 was started on August 27, 1979, and ended on October 6, 1979, following 2277 MWd of operation. The run was conducted in two segments. There were no scrams. (ERA citation 05:022435)

EGG/LTR-LO-87-80-132 PC **A05**/MF **A01**
Idaho National Engineering Lab., Idaho Falls.
LOFT Experimental Measurements Branch Analysis of a Transient Load Measuring System.
R. R. Good, and T. R. Meachum. 17 Mar 80, 78p
Contract EY-76-C-07-1570

An analysis of the performance of a load measuring system is presented. The load system was designed to measure the weight of a pressure vessel containing high pressure and temperature water. The uncertainty and frequency response of the system are quantified for both steady state and dynamic conditions as is the repeatability of the test rig. Computation of the mass flow exiting the system during explosive decompression of the system is also presented. (ERA citation 05:020651)

ESG-DOE-13294 PC **A03**/MF **A01**
Atomics International Div., Canoga Park, CA. Energy Systems Group.
Reactor Safety. Annual Technical Progress Report, Government Fiscal Year 1979.
15 Apr 80, 46p
Contract AT03-76SF74028

Information is presented on LMFBR reactor safety concerning the energetics effects of sodium spray fires; sodium drop and spray burning; core debris accommodation; attenuation in containment; and attenuation in the environment. (ERA citation 05:022452)

ESG-DOE-13312 PC **A02**/MF **A01**
Atomics International Div., Canoga Park, CA. Energy Systems Group.
CRBRP Sodium Fire Tests. Quarterly Technical Progress Report, October-December 1979.
29 Feb 80, 10p
Contract AM03-76SF00824

The objective of the small-scale group of tests is to demonstrate that sodium will drain from the surface of the fire suppression deck into the catch pan without interference during a spill event, and to demonstrate that burning is terminated following the spill event by the accumulation of combustion products inside the drain pipes. The results of this series of tests will be used to validate the catch pan fire suppression deck design concept based on the criteria that sodium will drain freely from the surface of the fire suppression deck and that burning is terminated in an acceptably short time (less than or equal to 36 h). The objective of the large-scale group of tests is to provide experimental data on the consequences of sodium spills using prototypic leak rates and to demonstrate the effectiveness of a large-scale fire suppression Q-deck assembly. (ERA citation 05:022453)

GA-A-15582 PC **A05**/MF **A01**
General Atomic Co., San Diego, CA.
Containment Atmosphere Response (CAR) Program. Second Status Report.
J. A. Landoni. Mar 80, 98p
Contract AT03-76ET35300

This report contains a summary of the work performed under the Containment Atmosphere Response (CAR) Program of the High-Temperature Gas-Cooled Reactor (HTGR) Safety Research Task since the publication of the previous status report (February 1978). The work concentrated on development of models describing containment phenomena during core heatup in support of probabilistic risk assessment studies. Models were completed for fission product iodine sorption on coated surfaces, diffusivity and retentivity of un-

treated concrete, iodine interaction with condensing steam on the containment atmosphere boundaries, and the cleanup filter system. These models were incorporated into a new computer program called CARCAS, a substantial extension of the CNTB computer program, and applied to Accident Initiation and Progression Analysis for Phase II core heatup sequences. Development was begun on models describing the postulated behavior of particulate fission products or aerosols within and leaking out of the containment. (ERA citation 05:020664)

GA-A-15622 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Risk Assessment of Major Fires in an HTGR Plant.
K. N. Fleming. Apr 80, 24p CONF-800403-38
Contract AT03-76ET35300
ANS thermal reactor safety meeting, Knoxville, TN, USA, 8 Apr 1980.

The HTGR Risk Assessment Study has been extended to include major fires as initiating events. The major aspects of this study have included the development of methodology, the collection and interpretation of fire experience data and the application of these methods and data to an HTGR plant. Qualitative and quantitative methods were derived to screen a nuclear plant layout and identify important fire locations. A fire propagation model was used in conjunction with experience data and detailed fault tree analyses to estimate common cause failure probabilities associated with a spectrum of potential fires. It was determined that fires make a significant contribution to the HTGR risk assessment only at accident frequency levels below 10 exp -7 /reactor-year. (ERA citation 05:020665)

GA-A-15625 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Path to Development of Quantitative Safety Goals.
V. Joksimovic, and W. J. Houghton. Apr 80, 11p CONF-800403-39
Contract AT03-76ET35300
ANS thermal reactor safety meeting, Knoxville, TN, USA, 8 Apr 1980.

There is a growing interest in defining numerical safety goals for nuclear power plants as exemplified by an ACRS recommendation. This paper proposes a lower frequency limit of approximately 10 exp -4 /reactor-year for design basis events. Below this frequency, down, to a small frequency such as 10 exp -5 /reactor-year, safety margin can be provided by, say, site emergency plans. Accident sequences below 10 exp -5 should not impact public safety, but it is prudent that safety research programs examine sequences with significant consequences. Once tentatively agreed upon, quantitative safety goals together with associated implementation tools would be factored into regulatory and design processes. (ERA citation 05:020666)

GA-A-15649 PC **A02**/MF **A01**
General Atomic Co., San Diego, CA.
Monte Carlo Method for Uncertainty Analysis of HTGR Accident Consequences.
D. J. Wakefield, and A. W. Barsell. Apr 80, 11p CONF-800403-40
Contract AT03-76ET35300
ANS thermal reactor safety meeting, Knoxville, TN, USA, 8 Apr 1980.

A method for propagating the uncertainties in the prediction of postulated accident consequences was devised. The method uses simplified mathematical models, derived from first principles and detailed deterministic computer model results to describe controlling physical processes in the transport of radioactive material from the plant and resulting population doses and health effects. These simplified models are used in a computationally efficient Monte Carlo error propagation technique. The approach is shown to be useful for uncertainty analysis of core heatup accidents postulated for the High Temperature Gas-Cooled Reactor. In combination with accident frequency predictions, the method provides the complementary cumulative risk curves typically used to present the final results of a risk assessment study. (ERA citation 05:020667)

GA-A-15734 MF **A01**
General Atomic Co., San Diego, CA.
Dresden 1 Plutonium Recycle Program. Final Report.
S. D. Bresnick. Jan 80, 71p
Contract EY-76-C-02-2210
Microfiche copies only.

This is the final report on the Dresden 1 Plutonium Recycle Demonstration Program. It covers the work performed from July 1, 1978 to completion, which includes in-pool inspection of two fuel assemblies, removal of two fuel rods, and post-irradiation examination (PIE) of six fuel rods. Appendix A describes the inspection and rod removal operations, and Appendix B describes the PIE work. (ERA citation 05:020636)

GEFR-SP-172 PC **A02**/MF **A01**
General Electric Co., Sunnyvale, CA. Advanced Reactor Systems Dept.
Carbon Transport in a Bimetallic Sodium Loop Simulating the Intermediate Heat Transport System of a Liquid Metal Fast Breeder Reactor.
L. V. Hampton, C. N. Spalaris, and P. Roy. Apr 80, 20p CONF-800401-7
Contract EY-76-C-03-0893-031
International conference of liquid metal technology for energy systems, Richland, WA, USA, 20 Apr 1980.

Carbon transport data from a bimetallic sodium loop simulating the intermediate heat transport system of a Liquid Metal Fast Breeder Reactor are discussed. The results of bulk carbon analyses after 15,000 hours' exposure indicate a pattern of carburization of Type 304 stainless steel foils which is independent of loop sodium temperature. A model based on carbon activity gradients accounting for this behavior is proposed. Data also indicate that carburization of Type 304 stainless steel is a diffusion-controlled process; however, decarburization of the ferritic 2 1/4 Cr-1Mo steel is not. It is proposed that the decarburization of the ferritic steel is controlled by the dissolution of carbides in the steel matrix. The differences in the sodium decarburization behavior of electroslag remelted and vacuum-arc remelted 2 1/4 Cr-1Mo steel are also highlighted. (ERA citation 05:020616)

GEFR-SP-180 PC **A02**/MF **A01**
General Electric Co., Sunnyvale, CA. Advanced Reactor Systems Dept.
Optimum Few-Group Cross Section Set for HCDAs in Heterogeneous LMFBRs.
P. T. Choong, and E. Kujawski. 6 Nov 79, 6p CONF-800607-32
Contract AM03-76SF00893
American Nuclear Society annual meeting, Las Vegas, NV, USA, 8 Jun 1980.

The loss of sodium in a hypothetical transient with failure to scram proceeds sequentially. In heterogeneous cores, the high power-to-flow fuel regions during the accident will boil first and voiding will propagate to the internal blankets with some time lag. Ideally the multigroup cross sections should take this into account. It would be unrealistic to attempt to generate different multigroup cross sections for each phase of the transient. The objective is to present a simple to implement and yet quite accurate scheme for generating an optimal multigroup cross section set for use in hypothetical core disruptive accidents (HCDA) analysis of heterogenous LMFBRs. Based on present and the past design procedures, five sets of multigroup cross section sets have been generated for calculating flowing sodium void reactivities of heterogeneous cores. (ERA citation 05:020668)

GEFR-SP-210 PC **A02**/MF **A01**
General Electric Co., Sunnyvale, CA. Advanced Reactor Systems Dept.
Background Noise Measurements on Prototype of SNR 300 Steam Generator at Hengelo.
D. A. Greene, G. J. A. M. Meyer, F. F. Ahlgren, and J. K. Van Westerbrugge. 1980, 10p CONF-800401-2
Contract EY-76-C-03-0893-031
International conference of liquid metal technology for energy systems, Richland, WA, USA, 20 Apr 1980.

Acoustic noise amplitudes were measured in a 50 MW helical coil prototype of a steam generator mounted in the Hengelo test facility in a joint technical program betwen GE/DOE and TNO/NERATOOM. Background noise measurements were completed with test conditions ranging from quiescent (with no sodium or water flow) to high thermal power transfer from the sodium circuit to the water circuit. The acoustic noise pressure on the vessel wall was measured using externally mounted accelerometers. Data were obtained for the effect of sodium flow rate on the acoustic noise amplitude. A preliminary correlation was derived for the acoustic noise generated by nucleate boiling. Leak detection and location were demonstrated. (ERA citation 05:020617)

GEFR-SP-212 PC **A02**/MF **A01**
General Electric Co., Sunnyvale, CA. Advanced Reactor Systems Dept.
Acoustic Leak Detection/Location System for Sodium Heated Steam Generators.
D. A. Greene, D. Meneely, and F. F. Ahlgren. 1980, 12p CONF-800401-3
Contract EY-76-C-03-0893-031
International conference of liquid metal technology for energy systems, Richland, WA, USA, 20 Apr 1980.

The design of an acoustic leak detection system to monitor for sodium-water reactions in a LMFBR steam generator is described. The detector is based on similar techniques to passive SONAR. It relies on the only absolute parameters associated with a sodium-water reaction: the leak is stationary in space and generates noise. By forming an array from externally mounted sensors and using statistical processing techniques, signals masked by the general background noise can be recovered. Supporting experimental and analytical investigations are also described. Predictions are made of the detection sensitivity of an acoustic leak detection system for an LMFBR. (ERA citation 05:020618)

GEFR-SP-213 PC **A02**/MF **A01**
General Electric Co., Sunnyvale, CA. Advanced Reactor Systems Dept.
Leak Location in a Double Wall Tube Steam Generator.
D. A. Greene, K. R. McMurtrie, and D. C. Gaubatz. 1980, 8p CONF-800401-4
Contract EY-76-C-03-0893-031
International conference of liquid metal technology for energy systems, Richland, WA, USA, 20 Apr 1980.

An experimental and analytical study was made of an acoustic location system for use with double wall tube steam generators. A conceptual design of an acoustic leak location system was developed. This system has the potential for detecting the third fluid gas escaping from the annulus between the double walled tubes into the sodium. The acoustic system uses an array of accelerometers mounted onto the outside of the steam generator vessel. Electronic circuitry selects a number of accelerometers, forms them into an array which focuses within the vessel. The volume of the vessel is sequentially scanned for anomalous acoustic energy. (ERA citation 05:020619)

HEDL-SA-1919-FP MF **A01**
Department of Energy, Richland, WA. Richland Operations Office.
FFTF Primary System Transition to Natural Circulation from Low Reactor Power.
G. D. Bouchey, S. L. Additon, and W. T. Nutt. Jan 80, 18p CONF-800226-4
Contract EY-76-C-14-2170
Specialists meeting on decay heat removal and natural circulation in FBR's, Upton, NY, USA, 28 Feb 1980.
Microfiche copies only.

Plans for reactor and primary loop natural circulation testing in the Fast Flux Test Facility (FFTF) are summarized. Detailed pretest planning with an emphasis on understanding the implications of process noise and model uncertainties for model verification and test acceptance are discussed for a transition to natural circulation in the reactor core and primary heat transport loops from initial conditions of 5% of rated reactor power and 75% of full flow. (ERA citation 05:020669)

HEDL-TC-1619 PC **A03**/MF **A01**
Hanford Engineering Development Lab., Richland, WA.

Summary Report of Fuel Rod Displacement Sensor for LOFT.
T. R. Billeter. Jan 80, 49p
Contract EY-76-C-14-2170

Qualification tests conducted for a period of 700 hours of each of three displacement measuring (LVDT) sensors confirmed applicability of the design for use in the Loss-of-Fluid-Test (LOFT) reactor. Operationally, the sensor satisfies all specified requirements for LOFT. Even for imposed temperature transients at rates up to 100 exp 0 F/s, the indicated displacement remained within the allowed maximum error band of +-10% of reading. The 0.625-inch O.D. by 5.5-inch long sensor exhibited a linearly related signal output variation for displacement variations of up to 1-inch range. Long term operation at temperatures of 100 exp 0 F to 800 exp 0 F caused no perceptible permanent change of operating characteristics. (ERA citation 05:022438)

IDO-1570-T37 PC **A02**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
LOFT Results Demonstrate Resistance of Unpressurized PWR Fuel to Loss-of-Coolant Accidents.
M. L. Russell. 1980, 6p
Contract EY-76-C-07-1570
Portions of document are illegible.

The initial visual examination of LOFT unpressurized fuel and evaluation of data recorded during the first three LOFT large-break, loss-of-coolant experiments (LOCE's) indicated the LOFT fuel to be in a reusable condition. Since the September 1977 core load, the LOFT fuel assemblies have been exposed to three large-break loss-of-coolant experiments; LOCE L1-5 without nuclear heat and LOSE's L2-2 and L2-3 with a 26 and 39 kw/m peak fuel rod linear heat generation rate at test initiation. The LOFT power operation has resulted in a cumulative fuel burnup of 987 megawatt-days per metric ton of uranium and linear heat generation levels of up to 53 kw/m at the peak power location. (ERA citation 05:020670)

INIS-mf-5093 PC **A02**/MF **A01**
Laboratoire Belge de l'Industrie Electrique, Linkebeek.
Deboration in Nuclear Stations of the PWR Type.
Sep 78, 1p
U.S. Sales Only.

Reactivity control in nuclear power stations of the PWR type is realised with boric acid. A method to concentrate boric acid without an evaporator has been studied. A flow-sheet with reverse osmosis is proposed. (Atomindex citation 11:500256)

INIS-mf-5376 PC **A06**/MF **A01**
Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Maschinenwesen.
Investigations of the HTR Safety Potential in Case of Failure of after-Heat Removal.
Diss. (D.Eng.),
K. W. Otto. 20 Feb 78, 121p
In German.
U.S. Sales Only.

The dissertation deals with the thermal and thermodynamic effects of a hypothetic accident with failure of after-heat removal in a HTR pebble-bed reactor. It is found that the HTR compares very favourably with other reactor types even today. As shown by the example of THTR-300, the outage of the forced circulation cooling system may last for several hours without damage to the components required for after-heat removal. Also, restarting of the cooling system does not cause excess loads on the primary circuit. As this long period of time is available for the detection and repair of the original failure, the probability of core heat-up, which is extremely small to begin with - is again decreased by several orders of magnitude. (Atomindex citation 11:499839)

NUREG/CR-0208 PC **A05**/MF **A01**
Argonne National Lab., IL.
Pulsed Neutron Activation Measurement of Emergency Core Coolant Bypass Flow on the LOFT (Loss of Fluid Test) Reactor.
Topical rept.,
Paul Kehler, and C. W. Solbrig. Jun 80, 93p ANL-CT-78-37-2-REV-1
Prepared in cooperation with EG and G Idaho, Inc., Idaho Falls.

Pulsed Neutron Activation (PNA) techniques were used to measure the relative ECC bypass flow at the Loss of Fluid Test (LOFT) reactor during Loss of Coolant Experiment (LOCE) L1-5, the last test of the non-nuclear series of experiments. In this test, the fuel modules of the core were installed and the configuration of the LOFT facility was identical to that of the planned nuclear test series. The L1-5 test simulated a 200 percent double-ended offset shear break in one of the cold legs of a four-loop PWR. During the test, the average ratio of the ECC bypass flow to the total ECC flow was measured twice and found to be about 40 percent. The capability of PNA techniques to measure two phase flow distribution in large systems, at high flow velocities and low densities was demonstrated.

NUREG/CR-1370 PC **A17**/MF **A01**
Westinghouse Electric Corp., Pittsburgh, PA. Nuclear Energy Systems Div.
PWR FLECHT SEASET 21-Rod Bundle Flow Blockage Task, Task Plan Report.
Rept. no. 5,
L. E. Hochreiter, R. A. Basel, R. J. Dennis, N. Lee, and H. W. Massie, Jr. Mar 80, 400p WCAP-9658, EPRI/NP-1382
Contract NRC-04-77-127

This report presents a decriptive plan of tests for the 21-Rod Bundle Flow Blockage Task of the Full-Length Emergency Cooling Heat Transfer Separate Effects and Systems Effects Test Program (FLECHT SEASET). This task will consist of forced and gravity reflooding tests utilizing electrical heater rods to simulate PWR nuclear core fuel rod arrays. All tests will be performed with a cosine axial power profile. These tests are planned to be used to determine effects of various flow blockage configurations (shapes and distributions) on reflooding behavior, to aid in development/assessment of computational models in predicting reflooding behavior of flow blockage configurations, and to screen flow blockage configurations for future 161-rod flow blockage bundle tests.

NUREG/CR-1459 PC **A14**/MF **A01**
EG and G Idaho, Inc., Idaho Falls.
Experiment Data Report for Semiscale Mod-3 Small Break Test Series (Tests S-SB-2 and S-SB-2A),
Dean H. Miyasaki. Jun 80, 318p EGG-2038
Contract DE-AC07-76IDO1570

Tests S-SB-2 and S-SB-2A were performed as part of the Semiscale Mod-3 portion of the Semiscale Program conducted by EG&G Idaho, Inc., for the United States Government. These tests were part of the Mod-3 Small Break Test Series performed to investigate the thermal-hydraulic phenomena resulting from a small break loss-of-coolant accident (LOCA) in a pressurized water reactor (PWR) system, and to provide experimental data for assessing the analytical capability of computer codes used in LOCA analysis. The primary objective of Test S-SB-2 is to provide data for a small break LOCA in which the break flow rate is greater than the high pressure safety injection rate. The primary objective of Test S-SB-2A is to determine the sensitivity of the Mod-3 system behavior when the core power is augmented to offset system heat losses, and to assess the analytical capability of the computer codes to model the effects of the atypical heat losses in the Semiscale Mod-3 system.

NUREG/CR-1460 PC **A03**/MF **A01**
Argonne National Lab., IL.
Light-Water-Reactor Safety Research Program.
Quarterly progress rept. Oct-Dec 79,
Walter E. Massey, and Jack A. Kyger. Jun 80, 45p ANL-80-43
See also report dated Mar 80, NUREG/CR-1337.

This progress report summarizes the Argonne National Laboratory work performed during October, November, and December 1979 on Water-Reactor safety problems. The research and development areas covered are: (1) Heat Transfer Coordination for LOCA Research Programs and (2) Transient Fuel Response and Fission-product Release.

NUREG/CR-1512 PC **A04**/MF **A01**
Aerospace Corp., El Segundo, CA. Lab. Operations.
Evaluation of Materials Interactions for Advanced Reactor Systems.
Annual progress rept. 8 Mar 79-7 Mar 80,
D. G. Swanson, and H. L. L. van Paassen. Jun 80, 71p ATR-80(7814)-1

The report consists of consultative support on a variety of topics related to the materials interactions that would occur following postulated core meltdown accidents in Light Water Reactors, Liquid Metal Fast Breeder Reactors and Gas-Cooled Reactors. The main topics that are addressed include: (1) evaluation of the Floating Nuclear Plant core ladle for delaying the melt-through penetration of a molten core; (2) review of recent experimental results on the interaction of molten UO2 with magnesium oxide; (3) considerations in retrofitting existing reactors with core retention systems; (4) review of the Gas-Cooled Fast Reactor post-accident fuel containment program; and (5) review and evaluation of recent experimental information in the area of sodium-concrete reactions.

NUREG-0690 PC **A15**/MF **A01**
Nuclear Regulatory Commission, Washington, DC.
U.S. Nuclear Regulatory Commission Annual Report (1979).
Annual rept. no. 5, 1 Oct 78-30 Sep 79.
1980, 330p

The report highlights major NRC activities in fiscal year 1979 under headings which correspond with the various facets of the agency's statutory responsibility. Topics include the following: Accident at Three Mile Island; Reactor regulation; Materials regulation; Domestic safeguards; Waste management; Inspection and enforcement; State programs; International activities; Standards development; Regulatory research; Informing and involving the public; Proceedings and litigation; Administration and management.

ORNL/NSIC-176 PC **A07**/MF **A01**
Oak Ridge National Lab., TN.
Descriptions of Selected Accidents That Have Occurred at Nuclear Reactor Facilities.
H. W. Bertini. Apr 80, 148p
Contract W-7405-ENG-26

This report was prepared at the request of the President's Commission on the Accident at Three Mile Island to provide the members of the Commission with some insight into the nature and significance of accidents that have occurred at nuclear reactor facilities in the past. Toward that end, this report presents a brief description of 44 accidents which have occurred throughout the world and which meet at least one of the severity criteria that were established. (ERA citation 05:022457)

PAT-APPL-6-005 947 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Device and Method for Shortening Reactor Process Tubes.
Patent Application,
C. E. Frantz, W. K. Alexander, and W. E. B. Lander. Filed 24 Jan 79, 17p
Contract EY-76-C-06-1857
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A device and method are described for in situ shortening of nuclear reactor zirconium alloy process tubes which have grown as a result of radiation exposure. An upsetting technique is utilized which involves inductively heating a short band of a process tube with simultaneous application of an axial load sufficient to cause upsetting with an attendant decrease in length of the process tube. (ERA citation 05:024066)

PATENT-4 175 208
Not available NTIS
Department of Energy, Washington, DC.
Self Locking Drive System for Rotating Plug of a Nuclear Reactor.
Patent,
J. E. Brubaker. Filed 23 Feb 78, patented 11 Dec 79, 8p PAT-APPL-880 679

Supersedes PAT-APPL-880 679-78.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A self locking drive system for rotating the plugs on the head of a nuclear reactor which is able to restrain plug motion if a seismic event whould occur during reactor refueling is described. A servomotor is engaged via a gear train and a bull gear to the plug. Connected to the gear train is a feedback control system which allows the motor to rotate the plug to predetermined locations for refueling of the reactor. The gear train contains a self locking double enveloping worm gear set. The worm gear set is utilized for its self locking nature to prevent unwanted rotation of the plugs as the result of an earthquake. The double enveloping type is used because its unique contour spreads the load across several teeth providing added strength and allowing the use of a conventional size worm. (ERA citation 05:024065)

PNL-SA-7746 PC A02/MF A01
Battelle Pacific Northwest Labs., Richland, WA.
Progress Toward Acoustic Emission Characterization for Continuous Monitoring Reactor Pressure Vessels.
P. H. Hutton, E. B. Schwenk, and R. J. Kurtz.
1979, 7p CONF-7909132-1
Contract EY-76-C-06-1830
International symposium - methods of nondestructive testing of materials and their application in nuclear engineering, Saarbrucken, F.R. Germany, 17 Sep 1979.

The purpose of this work is to evaluate the feasibility of detecting and analyzing flaw growth in an operating reactor vessel using acoustic emission (AE) data. A preliminary AE-flaw growth relationship has been developed encompassing six variables. This model relates AE count and energy to fatigue crack driving force delta K. Pattern recognition has been examined as a means of distinguishing crack growth AE from other acoustic signals with encouraging results. The program is moving into hardware implementation of relationships for testing and refinement by monitoring tests in heavy section specimens and subscale structures. The hardware system will become a reactor monitor prototype. (ERA citation 05:020599)

SAN-0115-T8 MF A01
SRI International, Menlo Park, CA.
Structural Response of 1/20 Scale Models of Above Core Structures to Increasingly Energetic Hypothetical Core Disruptive Accidents. Technical Report 7.
C. M. Romander. Jul 79, 103p
Contract EY-76-C-03-0115-097
Microfiche copies only.

Six experiments were performed to evaluate the structural response of an above core structure (ACS) to increasingly energetic hypothetical core disruptive accidents (HCDA). The tests were performed in a thickwall 1/20-scale model of a liquid metal fast breeder reactor (LMFBR) demonstration plant to provide information on ACS displacement as a function of HCDA energy so that computer codes such as SIMMER might include ACS displacement when calculating core release energetics. The 1/20-scale ACS models include a 5-kg aluminum block with dimensions that simulate the overall geometry of the ACS and the four columns that support the ACS over the core of the reactor. Each column includes an 8-in-long, 0.7-in-diameter 0.050-in-wall Ni 200 tubular section that experiences all of the deformation upon HCDA loading. The columns are supported by a rigid structure that simulates the geometrical constraints provided by the cover of the reactor. (ERA citation 05:022458)

SAND-79-1999C PC A02/MF A01
Sandia Labs., Albuquerque, NM.
Phenomenological Modelling of Steam Explosions.
M. L. Corradini, and D. S. Drumheller. 1980, 9p CONF-800403-20
Contract EY-76-C-04-0789
ANS thermal reactor safety meeting, Knoxville, TN, USA, 8 Apr 1980.

During a hypothetical core meltdown accident, an important safety issue to be addressed is the potential for steam explosions. This paper presents analysis and modelling of experimental results. There are four observations that can be drawn from the analysis: (1) vapor explosions are suppressed by noncondensible gases generated by fuel oxidation, by high ambient pressure, and by high water temperatures; (2) these effects appear to be trigger-related in that an explosion can again be induced in some cases by increasing the trigger magnitude; (3) direct fuel liquid-coolant liquid contact can explain small scale fuel fragmentation; (4) heat transfer during the expansion phase of the explosion can reduce the work potential. (ERA citation 05:020672)

SAND-79-2142C PC A02/MF A01
Sandia Labs., Albuquerque, NM.
Fires: What Plant Locations Should We Really Protect.
D. L. Berry. 1980, 8p CONF-800403-36
Contract EY-76-C-04-0789
ANS thermal reactor safety meeting, Knoxville, TN, USA, 8 Apr 1980.

A fire protection analysis technique was developed from earlier work involving the protection of nuclear power plants against acts of sabotage. Characteristics unique to fire phenomena were used to modify the sabotage analysis methodology. These characteristics include the effects of fuel loads, ventilation rates, heat loss areas, barrier ratings, and plant locations. The new fire analysis technique was applied to an example nuclear power plant having 85 different plant areas. It was found that some safety and nonsafety areas were both highly vulnerable to fire spread and important to overall safety, while other areas were found to be of marginal importance to fire safety. (ERA citation 05:020673)

SAND-80-0669 PC A06/MF A01
ANATECH International Corp., La Jolla, CA.
Non-Linear Analysis in Light Water Reactor Design.
Y. R. Rashid, M. N. Sharabi, R. E. Nickell, E. P. Esztergar, and J. W. Jones. Mar 80, 113p ALO-64, ANA-79-3
Contract EY-76-C-04-0789

The results obtained from a scoping study sponsored by the US Department of Energy (DOE) under the Light Water Reactor (LWR) Safety Technology Program at Sandia National Laboratories are presented. Basically, this project calls for the examination of the hypothesis that the use of nonlinear analysis methods in the design of LWR systems and components of interest include such items as: the reactor vessel, vessel internals, nozzles and penetrations, component support structures, and containment structures. Piping systems are excluded because they are being addressed by a separate study. Essentially, the findings were that nonlinear analysis methods are beneficial to LWR design from a technical point of view. However, the costs needed to implement these methods are the roadblock to readily adopting them. In this sense, a cost-benefit type of analysis must be made on the various topics identified by these studies and priorities must be established. This document is the complete report by ANATECH International Corporation. (ERA citation 05:020600)

SAND-80-0672 PC A11/MF A01
Science Applications, Inc., Ames, IA.
Draft Report: A Selection Methodology for LWR Safety R and D Programs and Proposals.
A. A. Husseiny, and R. L. Ritzman. Mar 80, 237p ALO-67, SAI-102-80-AM
Contract EY-76-C-04-0789

The results of work done to develop a methodology for selecting LWR safety R and D programs and proposals is described. A critical survey of relevant decision analysis methods is provided including the specifics of multiattribute utility theory. This latter method forms the basis of the developed selection methodology. Details of the methodology and its use are provided along with a sample illustration of its application. (ERA citation 05:020674)

SAND-80-0833C PC A02/MF A01
Sandia Labs., Albuquerque, NM.
Modelling of Molten Fuel/Concrete Interactions.
J. F. Muir, and A. S. Benjamin. 1980, 13p CONF-800403-21
Contract EY-76-C-04-0789
ANS thermal reactor safety meeting, Knoxville, TN, USA, 8 Apr 1980.

A computer program modelling the interaction between molten core materials and structural concrete (CORCON) is being developed to provide quantitative estimates of fuel-melt accident consequences suitable for risk assessment of light water reactors. The principal features of CORCON are reviewed. Models developed for the principal interaction phenomena, inter-component heat transfer, concrete erosion, and melt/gas chemical reactions, are described. Alternative models for the controlling phenomenon, heat transfer from the molten pool to the surrounding concrete, are presented. These models, formulated in conjunction with the development of CORCON, are characterized by the presence or absence of either a gas film or viscous layer of molten concrete at the melt/concrete interface. Predictions of heat transfer based on these models compare favorably with available experimental data. (ERA citation 05:020676)

SAND-80-0937C PC A02/MF A01
Sandia Labs., Albuquerque, NM.
LOCA Analyses for Nuclear Steam Supply Systems with Upper Head Injection.
R. K. Byers, and T. J. Bartal. 1980, 8p CONF-800403-25
Contract EY-76-C-04-0789
ANS thermal reactor safety meeting, Knoxville, TN, USA, 8 Apr 1980.

The term Upper Head Injection describes a relatively new addition to a nuclear reactor's emergency cooling system. With this feature, water is delivered directly to the top of the reactor vessel during a loss-of-coolant accident, in addition to the later injection of coolant into the primary operating loops. Established computer programs, with various modifications to models for heat transfer and two-phase flow, were used to analyze a transient following a large break in one of the main coolant loops of a reactor equipped with upper head injection. The flow and heat transfer modifications combined to yield fuel cladding temperatures during blowdown which were as much as 440K (800 exp 0 F) lower than were obtained with standard versions of the codes (for best estimate calculations). The calculations also showed the need for more uniformity of applications of heat transfer models in the computer programs employed. (ERA citation 05:020677)

SAND-80-0939C PC A02/MF A01
Sandia Labs., Albuquerque, NM.
Two-Phase Jet Loads.
D. Tomasko. 1980, 16p CONF-800403-23
Contract EY-76-C-04-0789
ANS thermal reactor safety meeting, Knoxville, TN, USA, 8 Apr 1980.

Two-phase jets are currently being studied to improve engineering models for the prediction of loads on pipes and structures during LOCAs. Multidimensional computer codes such as BEACON/MOD2, CSQ, and TRAC-P1A are being employed to predict flow characteristics and flow-structure loading. Our ultimate goal is to develop a new approximate engineering model which is superior to the F.J. Moody design model. Computer results are compared with data obtained from foreign sources, and a technique for using the TRAC-P1A vessel component as a containment model is presented. In general, good agreement with the data is obtained for saturated stagnation conditions; however, difficulties are encountered for subcooled stagnation conditions, possibly due to nucleation delay and non-equilibrium effects. (ERA citation 05:020678)

SAND-80-0947C PC A02/MF A01
Sandia Labs., Albuquerque, NM.
Structural Response to a Steam Explosion in a PWR.
R. L. Woodfin, and L. E. Voelker. 1980, 8p CONF-800403-22
Contract EY-76-C-04-0789
ANS thermal reactor safety meeting, Knoxville, TN, USA, 8 Apr 1980.

Beginning with the assumption that a hypothetical steam-explosion occurs in the pressure vessel of a

pressurized water reactor, the structural consequences are investigated. A simplified model of an individual installation is used for the investigation. Finite element and finite difference analyses of water-head impact conditions are described. Analysis of the possibility of ejection of a control rod drive assembly as a missile is investigated. Conclusions indicate that the only containment threatening consequence is the possible but unlikely generation and flight of such a missile and that large, i.e., whole head sized missiles, appear precluded. (ERA citation 05:020679)

UCLA-ENG-7974 PC **A11**/MF **A01**
California Univ., Los Angeles. Dept. of Chemical, Nuclear, and Thermal Engineering.
Determination of Optimal LWR Containment Design, Excluding Accidents More Severe Than Class 8.
L. Cave, and T. K. Min. Apr 80, 249p ALO-68
Contracts EY-76-C-04-0789, ET-78-S-04-5450

Information is presented concerning the restrictive effect of existing NRC requirements; definition of possible targets for containment; possible containment systems for LWR; optimization of containment design for class 3 through class 8 accidents (PWR); estimated costs of some possible containment arrangements for PWR relative to the standard dry containment system; estimated costs of BWR containment. (ERA citation 05:020602)

UNI-SA-69 PC **A02**/MF **A01**
UNC Nuclear Industries, Inc., Richland, WA.
Backup Safety System Ball Replacement Program Physics Testing at the Hanford N Reactor.
H. Toffer, and E. L. Benjamin. 1 Mar 80, 11p
CONF-800403-31
Contract EY-76-C-06-1857
ANS thermal reactor safety meeting, Knoxville, TN, USA, 8 Apr 1980.

A series of measurements established the acceptability of B sub 4 C-carbon balls as a suitable replacement material for the Sm sub 2 O sub 3 -alumina balls in the N Reactor backup safety system. Out-of-reactor tests provided a measurement of the required boron loadings of the new balls, confirmed superior burnout characteristics, and verified significantly less material activation. The in-core testing measured the shutdown margins for the backup safety system with the B sub 4 C-carbon balls under normal and special failure conditions. As a result of the ball replacement program, improvements in safe operation and better radiological control should be achieved at the N Reactor. (ERA citation 05:022441)

WAPD-TM-1253 PC **A07**/MF **A01**
Bettis Atomic Power Lab., West Mifflin, PA.
Summary of Several Hydraulic Tests in Support of the Light Water Breeder Reactor Design (LWBR Development Program).
K. D. McWilliams, and J. R. Turner. May 79, 142p
Contract AC11-76PN00014

As part of the Light Water Breeder Reactor development program, hydraulic tests of reactor components were performed. This report presents the results of several of those tests performed for components which are somewhat unique in their application to a pressurized water reactor design. The components tested include: triplate orifices used for flow distribution purposes, multiventuri type flowmeters, tight lattice triangular pitch rod support grids, fuel rod end support plates, and the balance piston which is a major component of the movable fuel balancing system. Test results include component pressure loss coefficients, flowmeter coefficients and fuel rod region pressure drop characteristics. (ERA citation 05:020623)

WAPD-TM-1383 MF **A01**
Bettis Atomic Power Lab., West Mifflin, PA.
ACCEPT: A Three-Dimensional Finite Element Program for Large Deformation Elastic-Plastic-Creep Analysis of Pressurized Tubes (LWBR/AWBA Development Program).
D. N. Hutula, and B. E. Wiancko. Mar 80, 135p
Contract AC11-76PN00014
Microfiche copies only.

ACCEPT is a three-dimensional finite element computer program for analysis of large-deformation elastic-plastic-creep response of Zircaloy tubes subjected to temperature, surface pressures, and axial force. A twenty-mode, tri-quadratic, isoparametric element is used along with a Zircaloy materials model. A linear time-incremental procedure with residual force correction is used to solve for the time-dependent response. The program features an algorithm which automatically chooses the time step sizes to control the accuracy and numerical stability of the solution. A contact-separation capability allows modeling of interaction of reactor fuel rod cladding with fuel pellets or external supports. (ERA citation 05:020625)

18J. Reactor Materials

CONF-791103-76 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Test Bed for High-Uranium-Loaded Fuel Plates.
R. L. Senn, and M. M. Martin. 1979, 3p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

An irradiation test facility has been designed and built to provide a test bed for irradiating a variety of miniature fuel plates. The objective of these tests is to screen various candidate materials as to their suitability for replacing the fully enriched uranium fuel materials currently used by the world's test and research reactors with a lower enrichment fuel material, without significantly degrading reactor operating characteristics and power levels. The use of low-uranium enrichment (up to 45%) in place of highly-enriched fuel for these reactors would reduce the potential for exp 235 U diversion. (ERA citation 05:020648)

CONF-800610-2 MF **A01**
Exxon Nuclear Idaho Co., Inc., Idaho Falls.
Removal of Actinides from Nuclear Fuel Reprocessing Wastes Using an Organophosphorous Extractant.
D. B. Chamberlain, H. R. Maxey, L. D. McIsaac, and G. J. McManus. Jan 80, 29p
Contract EY-76-C-07-1570
American Institute of Chemical Engineering conference, Philadelphia, PA, USA, 8 Jun 1980.
Microfiche copies only.

By removing actinides from nuclear fuel reprocessing wastes, long term waste storage hazards are reduced. A solvent extraction process to remove actinides has been demonstrated in miniature mixer-settlers and in simulated columns using actinide feeds. Nonradioactive pilot plant results have established the feasibility of using pulse columns for the process. (ERA citation 05:020117)

DOE/DP-0001-5 PC **A02**/MF **A01**
Department of Energy, Washington, DC. Office of Safeguards and Security.
Strategic Special Nuclear Material Inventory Differences. Semi-Annual Report.
Jan 80, 25p

This report provides and explains the generally small differences between the amounts of nuclear materials charged to DOE facilities and the amounts that could be physically inventoried. These Inventory Differences, previously called Material Unaccounted For (MUF), are being publicly released on a semiannual basis. This report covers data for the period from October 1, 1978, through March 31, 1979, and includes accounting corrections for data from earlier periods. (ERA citation 05:020205)

DPSPU-79-30-16 PC **A02**/MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Plant.
NDA For the SRP Fuel Fabrication Process.
R. V. Studley. Dec 79, 21p CONF-791117-23
Contract EY-76-C-09-0001
ANS topical conference, Kiawah Island, SC, USA, 26 Nov 1979.

The Savannah River Plant fuel fabrication process is described to illustrate requirements for a variety of assay techniques. Criteria and design of some NDA systems for this process are discussed. Initial performance of a neutron activation analysis system (californium shuffler) as an assay method for several varieties of material is reported. 25 figures. (ERA citation 05:020206)

DPSTSA-200-5 MF **A01**
Du Pont de Nemours (E.I.) and Co., Aiken, SC. Savannah River Lab.
Safety Analysis Report for the exp 238 PuO sub 2 Fuel Form Facility.
C. L. Angerman, D. F. Bickford, T. H. Gould, Jr., and P. K. Smith. Aug 77, 200p
Contract EY-76-C-09-0001
Microfiche copies only.

The Plutonium Fuel Form (PuFF) Facility has been constructed at the Savannah River Plant to manufacture 30 to 60 kg/yr of exp 238 Pu fuel forms for space power applications. This facility is located in the existing Building 235-F near the geographical center of the Savannah River Plant (SRP) site. Pilot production is scheduled to begin in July 1977, with full-scale production in April 1978. The process line of the facility consists of nine separate, interconnected shielded cells; five shielded wing cabinets or glove boxes; three hoods; and contained auxiliary equipment. These process enclosures will be, for the most part, under an atmosphere of recirculating inert gas. The products of the facility will be dense fuel forms manufactured from PuO sub 2 powder with a nominal isotopic composition of 80% exp 238 Pu-20% exp 239 Pu. This powder, made from calcined oxalate, has been produced safely at a rate of about 20 kg exp 238 Pu/yr in the H-Area B-Line in Building 221-H for approximately ten years. This report describes design objectives, nature of operations, potential hazards and limiting factors, facility response to postulated accidents and failures, and environmental effects. The results of the analyses described in this report indicate that the facility has the capacity to prevent or sufficiently reduce accidents that represent potential risks to health and safety. The safety analysis in conjunction with process requirements provides the bases for Technical Standards for operation. The analysis also documents the degree of conformance of the facility design with the General Design Criteria - Plutonium Facilities and the Environmental Statement. (ERA citation 05:020115)

GEFR-SP-202 PC **A02**/MF **A01**
General Electric Co., Sunnyvale, CA. Advanced Reactor Systems Dept.
Experimental Determination of Plutonia and Urania Solubility in Liquid Metal.
R. W. Caputi, and M. G. Adamson. Apr 80, 9p
CONF-800401-8
Contract EY-76-C-03-0893-029
International conference of liquid metal technology for energy systems, Richland, WA, USA, 20 Apr 1980.

Available data pertaining to the solubilities of urania and plutonia in liquid sodium at typical reactor coolant temperatures is reviewed. The recurring problem of separating true solubility from micro-spallation/mechanical dispersal effects is discussed and was considered in the experimental design. Descriptions of the filter capsules and analytical techniques that were used are provided. Derived solubility data for both UO sub 2 (Na sub 3 UO sub 4) and PuO/sub 2-x/ (Na sub 3 PuO sub 4) from a powder blended mixed oxide chip (75% UO sub 2 /25% PuO sub 2 , initial O:M = 2.00) are given for temperatures in the range 575 to 810 exp 0 C. Significant levels of both dissolved oxide and micro-particulate were present in the sodium at higher temperatures (700 and 800 exp 0 C). (ERA citation 05:022401)

LA-UR-80-740 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Potential Improvements in Materials Accounting for an Internationally Safeguarded Fuels Reprocessing Plant.
E. A. Hakkila, H. A. Dayem, D. D. Cobb, R. J. Dietz, and J. P. Shipley. 1980, 7p CONF-800315-11
Contract W-7405-ENG-36
Symposium of the European Safeguards Research and Development Association, Edinburgh, UK, 26 Mar 1980.

The effectiveness of improved materials accounting was evaluated using computer modeling, simulation, and analysis techniques for two model reprocessing plants. One plant, sized to 210 MTHM/yr, represents the small plants currently under international safeguards and the other, sized to

1500 MTHM/yr, represents the large plants expected in the future. The study indicates that conventional accounting may meet IAEA goal quantities and detection times for low-enriched uranium in these facilities. Dynamic materials accounting can meet the IAEA goal for detecting abrupt (1 to 3 wk) diversion of 8 kg of plutonium. Current materials accounting techniques probably cannot meet the protracted diversion goal of detecting 8 kg for plutonium in 1 yr. Facility design features that can improve the effectiveness of materials accounting in future plants are discussed. (ERA citation 05:020208)

LA-UR-80-743 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Effects of (Alpha ,N) Contaminants and Sample Multiplication on Statistical Neutron Correlation Measurements.
E. J. Dowdy, G. E. Hansen, A. A. Robba, and J. C. Pratt. 1980, 6p CONF-800315-13
Contract W-7405-ENG-36
Symposium of the European Safeguards Research and Development Association, Edinburgh, UK, 26 Mar 1980.

The complete formalism for the use of statistical neutron fluctuation measurements for the nondestructive assay of fissionable materials has been developed. This formalism includes the effect of detector deadtime, neutron multiplicity, random neutron pulse contributions from (alpha ,n) contaminants in the sample, and the sample multiplication of both fission-related and background neutrons. (ERA citation 05:020947)

NUREG/CR-1274 PC **A04**/MF **A01**
Oak Ridge National Lab., TN.
Flaw Preparations for HSST Program Vessel Fracture Mechanics Testing: Mechanical-Cyclic Pumping and Electron-Beam Weld-Hydrogen-Charge Cracking Schemes.
P. P. Holz. Jun 80, 67p ORNL/NUREG/TM-369
Contract W-7405-eng-26

The purpose of the document is to present schemes for flaw preparations in heavy section steel. The ability of investigators to grow representative sharp cracks of known size, location, and orientation is basic to representative field testing to determine data for potential flaw propagation, fracture behavior, and margin against fracture for high-pressure-, high-temperature-service steel vessels subjected to increasing pressurization and/or thermal shock. Gaging for analytical stress and strain procedures and ultrasonic and acoustic emission instrumentation can then be applied to monitor the vessel during testing and to study crack growth. This report presents flaw preparations for HSST fracture mechanics testing. Cracks were grown by two techniques: (1) a mechanical method wherein a premachined notch was sharpened by pressurization and (2) a method combining electron-beam welds and hydrogen charging to crack the chill zone of a rapidly placed autogenous weld. The mechanical method produces a naturally occurring growth shape controlled primarily by the shape of the machined notch; the welding-electrochemical method produces flaws of uniform depth from the surface of a wall or machined notch. Theories, details, discussions, and procedures are covered for both of the flaw-growing schemes.

NUREG/CR-1441 PC **A04**/MF **A01**
GARD, Inc., Niles, IL.
Inspection of Nuclear Reactor Welding by Acoustic Emission.
Final rept. Nov 78-Feb 80,
D. W. Prine, T. A. Mathieson, and B. S. Filar. May 80, 68p

The report is the final report on a two-year extension of a previous three-year program. This two-year program was aimed at extending the capability of in-process acoustic emission monitoring of nuclear fabrication welds from flaw detection and location to flaw characterization in terms of type and size. During this phase a field-hardened system based on design concepts that were developed and tested during the first year was fabricated and the resulting system was successfully tested in a nuclear fabrication shop. This report contains a detailed description of the microprocessor-based three channel weld monitor in addition to a description of the results of the field test.

NUREG-0561-REV-1 PC **A05**/MF **A01**
Nuclear Regulatory Commission, Washington, DC. Div. of Safeguards.
Physical Protection of Shipments of Irradiated Reactor Fuel; Interim Guidance.
Regulatory rept.
Jun 80, 78p

During May, 1979, the U.S. Nuclear Regulatory Commission approved for issuance in effective form new interim regulations for strengthening the protection of spent fuel shipments against sabotage and diversion. The new regulations were issued without benefit of public comment, but comments from the public were solicited after the effective date. Based upon the public comments received, the interim regulations were amended and reissued in effective form as a final interim rule in May, 1980. The present document supersedes a previously issued interim guidance document, NUREG-0561 (June, 1979) which accompanied the original rule. This report has been revised to conform to the new interim regulations on the physical protection of shipments of irradiated reactor fuel which are likely to remain in effect until the completion of an ongoing research program concerning the response of spent fuel to certain forms of sabotage, at which time the regulations may be rescinded, modified or made permanent, as appropriate. This report discusses the amended regulations and provides a basis on which licensees can develop an acceptable interim program for the protection of spent fuel shipments.

PATENT-4 170 817
Not available NTIS
Department of Energy, Washington, DC.
Method and Means of Packaging Nuclear Fuel Rods for Handling.
Patent,
M. F. Adam. Filed 2 May 78, patented 16 Oct 79, 4p PAT-APPL-902 184
Supersedes PAT-APPL-902 184-78.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

Nuclear fuel rods, especially spent nuclear fuel rods that may show physical distortion, are encased within a metallic enclosing structure by forming a tube about the fuel pod. The tube has previously been rolled to form and overlapping tubular structure and then unrolled and coiled about an axis perpendicular to the tube. The fuel rod is inserted into the tube as the rolled tube is removed from a coiled strip and allowed to reassume its tubular shape about the fuel rod. Rollers support the coiled strip in an open position as the coiled strip is uncoiled and allowed to roll about the fuel rod. (ERA citation 05:024076)

PATENT-4 172 742
Not available NTIS
Department of Energy, Washington, DC.
Alloys for a Liquid Metal Fast Breeder Reactor.
Patent,
A. F. Rowcliffe, M. L. Bleiberg, S. Diamond, and R. Bajaj. Filed 6 Jan 78, patented 30 Oct 79, 12p PAT-APPL-867 656
Supersedes PAT-APPL-867 656-78.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An gamma-prime was precipitation-hardened iron-chromium-nickel alloy was designed with emphasis on minimum nickel and chromium contents to reduce the swelling tendencies of these alloys when used in liquid metal fast breeder reactors. The precipitation-hardening components have been designed for phase stability and such residual elements as silicon and boron, also have been selected to minimize swelling. Using the properties of these alloys in one design would result in an increased breeding ratio over 20% cold worked stainless steel, a reference material, of 1.239 to 1.310 and a reduced doubling time from 15.8 to 11.4 years. The gross stoichiometry of the alloying composition comprises from about 0.04% to about 0.06% carbon, from about 0.05% to about 1.0% silicon, up to about 0.1% zirconium, up to about 0.5% vanadium, from about 24% to about 31% nickel, from 8% to about 11% chromium, from about 1.7% to about 3.5% titanium, from about 1.0% to about 1.8% aluminum, from about 0.9% to about 3.7% molybdenum, from about 0.04% to about 0.8% boron, and the balance iron with incidental impurities. (ERA citation 05:024372)

PB80-194400 Not available NTIS
National Bureau of Standards, Washington, DC.
Assessing Errors Related to Characteristics of the Items Measured.
Final rept.,
W. Liggett. 1980, 5p
Sponsored in part by Nuclear Regulatory Commission, Washington, DC.
Pub. in Jnl. Inst. Nucl. Manage. IX n1 p78-82 1980.

Errors that are related to some intrinsic property of the items measured are often encountered in nuclear material accounting. An example is the error in nondestructive assay (NDA) measurements caused by uncorrected matrix effects. Such errors cannot be assessed by remeasurement of the items, and they cannot be fully assessed by measuring standards, although standards that span the range of the item characteristics might give upper and lower bounds. Nuclear material accounting requires for each material type one measurement method for which bounds on these errors can be determined. If such a method is available, a second method might be used to reduce costs or to improve precision. If the second method is less expensive than the first, then cost might be reduced by substituting the second method for the first in the measurement of some items. If the measurement error for the first method is longer-tailed than Gaussian, then precision might be improved by measuring all items by both methods.

PNL-3166(Pt.2) PC **A04**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Cladding Hull Decontamination and Densification Process. Part 2. Densification by Inductoslag Melting.
R. G. Nelson, and D. R. Montgomery. Apr 80, 52p
Contract EY-76-C-06-1830

The Inductoslag melting process was developed to densify Zircaloy-4 cladding hulls. It is a cold crucible process that uses induction heating, a segmented water-cooled copper crucible, and a calcium fluoride flux. Metal and flux are fed into the furnace through the crucible, located at the top of the furnace, and the finished ingot is withdrawn from the bottom of the furnace. Melting rates of 40 to 50 kg/h are achieved, using 100 to 110 kW at an average energy use of 2.5 kWh/kg. The quality of ingots produced from factory supplied cladding tubing is sufficient to satisfy nuclear grade standards. An ingot of Zircaloy-4, made from melted cladding tubing that had been autoclaved to near reactor exposure and then descaled by the hydrogen fluoride decontamination process prior to Inductoslag melting, did not meet nuclear grade standards because the hydrogen, nitrogen, and hardness levels were too high. Melting development work is described that could possibly be used to test the capability of the Inductoslag process to satisfactorily melt a variety and mix of materials from LWR reprocessing, decontamination, and storage options. Results of experiments are also presented that could be used to improve remote operation of the melting process. (ERA citation 05:020121)

UCRL-82225 MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Real Time Loss Detection for SNM in Process.
J. V. Candy, D. R. Dunn, and D. T. Gavel. 20 Mar 80, 9p CONF-800315-16
Contract W-7405-ENG-48
Symposium of the European Safeguards Research and Development Association, Edinburgh, UK, 26 Mar 1980.
Microfiche copies only.

This paper discusses the basis of a design for real time special nuclear material (SNM) loss detectors. The design utilizes process measurements and signal processing techniques to produce a timely estimate of material loss. A state estimator is employed as the primary signal processing algorithm. Material loss is indicated by changes in the states or process innovations (residuals). The

design philosophy is discussed in the context of these changes. (ERA citation 05:020215)

WAPD-TM-1369 PC **A04**/MF **A01**
Bettis Atomic Power Lab., West Mifflin, PA.
Model for Incorporating Fuel Swelling and Clad Shrinkage Effects in Diffusion Theory Calculations (LWBR Development Program).
W. C. Schick, Jr., S. Milani, and E. Duncombe. Mar 80, 56p
Contract AC11-76PN00014

A model has been devised for incorporating into the thermal feedback procedure of the PDQ few-group diffusion theory computer program the explicit calculation of depletion and temperature dependent fuel-rod shrinkage and swelling at each mesh point. The model determines the effect on reactivity of the change in hydrogen concentration caused by the variation in coolant channel area as the rods contract and expand. The calculation of fuel temperature, and hence of Doppler-broadened cross sections, is improved by correcting the heat transfer coefficient of the fuel-clad gap for the effects of clad creep, fuel densification and swelling, and release of fission-product gases into the gap. An approximate calculation of clad stress is also included in the model. (ERA citation 05:020624)

WAPD-TM-1456 PC **A05**/MF **A01**
Bettis Atomic Power Lab., West Mifflin, PA.
Review of Thorium-U233 Cycle Thermal Reactor Benchmark Studies (AWBA Development Program).
J. J. Ullo, J. Hardy, Jr., and N. M. Steen. Mar 80, 83p
Contract AC11-76PN00014

A survey is made of existing integral experiments for U233 systems and thorium-uranium based fuel systems. The aim is to understand to what extent they give a consistent test of ENDF/B-IV nuclear data. A principal result is that ENDF/B-IV leads to an underprediction of neutron leakage. Results from testing alternate thorium data sets are presented. For one evaluation due to Leonard, the results depict a possible growing discrepancy between measured integral parameters such as rho exp 02 and I exp 232 and the differential data, which underpredicts these parameters. Sensitivities to other nuclear data components, notably the fission neutron spectrum, were determined. A new harder U233 spectrum significantly reduces a bias trend in K/sub eff/ vs leakage. (ERA citation 05:022405)

Y-2219 PC **A03**/MF **A01**
Oak Ridge Y-12 Plant, TN.
Statistical Analysis of Nuclear Material Weighing Systems at the Oak Ridge - Y-12 Plant.
A. H. Hammer. Apr 80, 26p
Contract W-7405-ENG-26

The variation in weight measurements on the electronic scales purchased for the Dynamic Special Nuclear Materials Control and Accountability System (DYMCAS) has been characterized and estimated to be more than is acceptable when using the current weighing methods. New weighing procedures have been developed which substantially reduce this variation and bring the weight errors within the Y-12 Plant Nuclear Materials Control and Accountability Department's desired +- 2-g accuracy. (ERA citation 05:020216)

18K. Reactor Physics

CONF-791103-78 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Methods Development for Criticality Safety Analysis.
R. M. Westfall. 1979, 6p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

A status review on the work at Oak Ridge to develop improved methods for performing multigroup, discrete-ordinates, and Monte Carlo criticality safety analyses is presented. In the area of multigroup cross section preparation this work entails the testing of ENDE/B-IV based and other cross-section libraries in the SCALE system, the development of improved cross-section processing methods for the AMPX system, and the generation of an ENDF/B-V based library. In the area of systems analysis this work entails improvements to the one-dimensional discrete-ordinates code XSDRNPM-S, the testing of the combinatorial geometry version of KENO, KENO-IV/CG, and development of an advanced version of KENO, KENO-V. Also presented is a brief review of the existing criticality safety analytical sequences in the SCALE system, CSAS1 and CSAS2, and the development of the advanced analytical sequences CSAS3 and CSAS4. (ERA citation 05:021013)

CONF-791103-80 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Application of Depletion Perturbation Theory to Fuel Cycle Burnup Analysis.
J. R. White. 1979, 7p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

Over the past several years static perturbation theory methods have been increasingly used for reactor analysis in lieu of more detailed and costly direct computations. Recently, perturbation methods incorporating time dependence have also received attention, and several authors have demonstrated their applicability to fuel burnup analysis. The objective of the work described here is to demonstrate that a time-dependent perturbation method can be easily and accurately applied to realistic depletion problems. (ERA citation 05:020638)

CONF-791103-84 PC **A02**/MF **A01**
Tennessee Univ., Knoxville.
Improved Criticality Search Techniques for Low and High Enriched Systems.
M. J. Lorek, H. L. Dodds, L. M. Petrie, and R. M. Westfall. 1979, 7p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

A new automated search technique has been developed to improve the computational efficiency of performing criticality searches on low and high enriched systems with codes such as ANISN and KENO-IV. The technique employs a least-squares fit to a cubic polynomial on parameter values that have been previously generated either by the Extended Mean Value Theorem (EMVT) or by previous curve fits. The solution of the cubic for its roots at the desired value of K-effective completes one pass for the fixed value search while the solution of its derivative provides information about maximum values. This new search technique has been implemented in a FORTRAN routine called OPTMIZ which will eventually be part of a module in the SCALE system. (ERA citation 05:021014)

CONF-791103-87 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Reactivity Effect of Cross-Section Processing for Moist Bulk-Oxide Criticals.
J. A. Bucholz, and R. M. Westfall. 1979, 7p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

Good multigroup cross-section data is necessary if accurate analyses of critical or slightly sub-critical systems are performed. How the flux spectrum as calculated by the Nordheim method and by a more exact method can ultimately affect the calculated multiplication and/or critical mass of slightly moderated bulk-oxide systems is shown. Self-shielded multigroup cross sections were generated using the Nordheim method as implemented in the NITAWL code and by a more exact method as implemented in the ROLAIDS code. To eliminate geometric effects, both codes were used to generate cross sections for an infinite homogeneous media of U sub 3 O sub 8 and water (U = 4.65% Uranium 235). (ERA citation 05:021015)

CONF-791103-95 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Power Spectral Density Measurements with exp 252 Cf for a Light Water Moderated Research Reactor.
W. T. King, and J. T. Mihalczo. 1979, 5p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

A method of determining the reactivity of far subcritical systems from neutron noise power spectral density measurements with exp 252 Cf has previously been tested in fast reactor critical assemblies: a mockup of the Fast Flux Test Facility reactor and a uranium metal sphere. Calculations indicated that this measurement was feasible for a pressurized water reactor (PWR). In order to evaluate the ability to perform these measurements with moderated reactors which have long prompt neutron lifetimes, measurements were performed with a small plate-type research reactor whose neutron lifetime (57 microseconds) was about a factor of three longer than that of a PWR and approx. 50% longer than that of a boiling water reactor. The results of the first measurements of power spectral densities with exp 252 Cf for a water moderated reactor are presented. (ERA citation 05:020649)

CONF-791103-97 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Computation of Analytical Bounds for Cross Section Self-Shielding Factors.
J. Barhen, and D. G. Cacuci. 1979, 7p
Contract W-7405-ENG-26
American Nuclear Society meeting, San Francisco, CA, USA, 12 Nov 1979.

The shielding factor method (SFM) is a frequently used economical procedure for computing the effective multigroup cross sections needed in reactor analysis. While initially developed and employed in codes used by the fast reactor community, the method has been receiving increased attention in recent years from the electric utility industry, for applications to power reactors. A fundamental problem regarding the method's applicability is to determine the limits of the range of values within which a cross section shielding factor is restricted, and whether these limits are physically meaningful. In a previous paper strict upper and lower bounds for the transport f-factor and for the sum of reaction f-factors were derived and discussed. The purpose of the present work is to present extensions of the methodology used for the upper and lower bounds of the transport f-factor and reaction f-factors. (ERA citation 05:020639)

CONF-800431-4 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Four Critical Facilities: Their Capabilities and Programs.
G. E. Whitesides. 1980, 11p
Contract W-7405-ENG-26
Nuclear criticality safety topical meeting, El Paso, TX, USA, 8 Apr 1980.

Information is presented on the critical experiments facilities at Babcock and Wilcox, Lynchburg, Virginia; at Battelle Pacific Northwest Laboratory in Hanford, Washington; at Rockwell-International in Rocky Flats, Colorado; and at Los Alamos Scientific Laboratory in New Mexico. It is noted that the critical mass facilities which still exist in this country represent a bare minimum for maintaining a measurement program sufficient for meeting data requirements. (ERA citation 05:021017)

CONF-800431-5 PC **A02**/MF **A01**
Idaho National Engineering Lab., Idaho Falls.
Influence of Safeguards and Fire Protection on Criticality Safety.
D. E. Six. 1980, 23p
Contract EY-76-C-07-1570
Nuclear criticality safety topical meeting, El Paso, TX, USA, 8 Apr 1980.

There are several positive influences of safeguards and fire protection on criticality safety. Experts in each discipline must be aware of regulations and requirements of the others and work together to ensure a fault-tree design. EG and G Idaho, Inc., routinely uses an Occupancy-Use Readiness Manual to consider all aspects of criticality safety, fire protection, and safeguards. The use of the analytical tree is described. (ERA citation 05:021018)

18L. Reactors (Power)

CONF-800459-1 MF **A01**
Oak Ridge National Lab., TN.

Development of the Centralized Reliability Data Organization (CREDO).
T. F. Bott, G. W. Cunningham, N. M. Greene, P. M. Haas, and S. D. Hudson. 1980, 26p
Contract W-7405-ENG-26
Advances in reliability technology symposium and 3. European reliability data bank seminar, Bradford, UK, 9 Apr 1980.
Microfiche copies only.

The Centralized Reliability Data Organizaton (CREDO) has been established by the Reactor Research and Technology Division of the Department of Energy (RRT/DOE) at Oak Ridge National Laboratory (ORNL). It's primary functions are collection, evaluation and dissemination of reliability/availability data pertaining to advanced reactors. Associated information and analysis services will be provided to users. Interface and cooperative data exchange with existing US and international data banks is an integral part of CREDO's program plan. This paper outlines the design and operation of the proposed system and summarizes the status of its development. The schedule for developing CREDO has been lengthened as appropriate to the current schedule for development of advanced reactors in the US, but the initial development phase is nearing completion, and demonstration of system capabilities is anticipated prior to the end of FY 1980. (ERA citation 05:022377)

18N. Snap Technology

LA-8279-PR PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
General-Purpose Heat Source Project and Space Nuclear Safety and Fuels Program. Progress Report.
W. J. Maraman. Dec 79, 34p
Contract W-7405-ENG-36

This formal monthly report covers the studies related to the use of exp 238 PuO sub 2 in radioisotopic power systems carried out for the Advanced Nuclear Systems and Projects Division of the Los Alamos Scientific Laboratory. The two programs involved are general-purpose heat source development and space nuclear safety and fuels. Most of the studies discussed hear are of a continuing nature. Results and conclusions described may change as the work continues. (ERA citation 05:020223)

LA-8311-PR PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
General-Purpose Heat Source Project and Space Nuclear Safety and Fuels Program. Progress Reportt, January 1980.
W. J. Maraman. Apr 80, 25p
Contract W-7405-ENG-36

This formal monthly report covers the studies related to the use of exp 238 PuO sub 2 in radioisotopic power systems carried out for the Advanced Nuclear Systems and Projects Division of the Los Alamos Scientific Laboratory. The two programs involved are the general-purpose heat source development and space nuclear safety and fuels. Most of the studies discussed here are of a continuing nature. Results and conclusions described may change as the work continues. Published reference to the results cited in this report should not be made without the explicit permission of the person in charge of the work. (ERA citation 05:020224)

PNL-3204 PC **A04**/MF **A01**
Battelle Pacific Northwest Labs., Richland, WA.
Stress Analysis and Testing of the Outer Capsule Design for the Strontium Heat Source Development Program.
F. A. Simonen, R. J. Shippell, Jr., and D. G. Atteridge. Jan 80, 71p
Contract EY-76-C-06-1830

The objective of the Strontium Heat Source Development Program is to obtain the data needed to license exp 90 SrF sub 2 heat sources - specifically the exp 90 SrF sub 2 capsules produced in the Waste Encapsulation and Storage Facility (WESF) at Hanford. Toward this end, a high integrity outer capsule has been designed to replace the present outer capsule of the WESF exp 90 SrF sub 2 capsule. The proposed design of a Hastelloy S outer capsule which features a mechanical interlock type of end closure is described. Qualification testing requirements are outlined, and stress analyses and developmental tests are described. These tests were performed on AISI-1018 steel stand-in capsules, and included both external pressure and impact tests. The external pressure tests showed that stress calculations seriously overestimated the pressure capability of the outer capsule. Possible reasons for the lack of agreement between the tests and the analyses are evaluated. The stress analyses and tests results indicate that the proposed outer capsule will meet the heat source qualification requirements. Future tests will be conducted to experimentally verify that the Hastelloy S outer capsule in an aged condition meets the structural integrity requirements. (ERA citation 05:020226)

19. ORDNANCE

19A. Ammunition, Explosives, and Pyrotechnics

AD-A085 398/6 PC **A03**/MF **A01**
Cold Regions Research and Engineering Lab Hanover NH
Influence of Nose Shape and L/D Ratio on Projectile Penetration in Frozen Soil.
Special rept.,
Paul W. Richmond. Apr 80, 27p Rept no. CRREL-SR-80-17

This report presents the results of a laboratory test program designed to determine the applicability of two analytical solutions to projectile penetrations in frozen soils. The test program consisted of firing small caliber cylindrical projectiles into frozen soil targets. Four types of 7.9-mm-diam projectiles were tested: two with a hemispherical nose the other two flat-nosed, with both long (length/diameter = 4) and short (L/D = 2) versions of each nose shape. Penetration depth versus impact velocity data are presented. Comparisons of the data indicate that a flat-nosed projectile is a less efficient penetrator than one of equal weight with a hemispherical nose. A small increase in resistance to penetration is observed for an increased L/D ratio. Two penetration solutions are compared with the test results. One is empirical, based on target strength and projectile characteristics. The other, a closed form solution, is based on the expansion of a spherical cavity in the target material. Modifications and further definition of nose shape coefficients and a mass scaling factor increase the applicability and accuracy of the empirical method to the solution of small arms penetration problems. The closed form solution performed well for impact velocities below 600 m/s. (Author)

AD-A085 745/8 PC **A07**/MF **A01**
Bulova Systems and Instruments Corp Valley Stream NY
Prototype Automated Equipment to Perform Poising and Beat Rate Operations on the M577 MTSQ Fuze.
Final technical rept. 23 Mar 77-30 Sep 78,
Carl Biro. 30 Sep 78, 129p
Contract DAAA21-76-C-0157

This report summarizes the design and development of two automatic process control machines for the M577 MTSQ Fuze. The work was performed under contract DAAA21-76-C-0157, U.S. Army ARRADCOM, DOVER, N.J. from 23 March 1977 through 30 September 1978. This followed an initial feasibility demonstration phase from 4 March 1976 to 4 October 1976. The two machines developed are the Automatic Regulation Machine which sets the M577 Fuze Timer beat rate and the Automatic Poising Machine which dynamically balances the Timer balance wheel assemblies. The basic design concepts established during the Engineering Study (Feasibility) Phase provided the primary design parameters for this equipment. The feasibility model of the Automatic Regulation Fixture is shown in Figure 1. Regulation of the Timer Assembly is accomplished by shortening the Hairspring length using successive, progressive ultrasonic welds to the hypodermic tube projecting from the End Support. To regulate in this manner the timer beat frequency established by the initial weld has to be approximately 1.0 beat per second slow. The production Automatic Regulation Machine Figure 2, consists of a manually loaded fixture, a precision servo table, an ultrasonic welder and a Hewlett Packard 9825 computer control. The Timer beat frequency is monitored continuously and the Timer is powered by its Mainspring. Process control data can be printed out at the machine or batched to a central site. Included as auxiliary equipment are an oscilloscope and a visicorder which provide additional process information and aid in trouble shooting.

LA-UR-80-1268 PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Studying Explosives with Aquaria: Fishing for Data.
S. Goldstein. 1980, 11p CONF-800533-1
Contract W-7405-ENG-36
Meeting of New Mexico Network for Women in Science and Engineering, Albuquerque, NM, USA, May 1980.

The aquarium method for investigating the differences between ideal and nonideal explosives is described. In this method, a uniform stick of explosive is suspended in a tank of water and detonated at its upper end. A series of snapshots are taken as the detonation proceeds down the stick and as the shock wave, with gases expanding behind it, expands in the water. These photographic data can be used to determine detonation velocity, shock wave velocity, pressure gradients on both sides of the shock wave, and how closely ideal detonational behavior is achieved with a given detonation. PBX-9502, PBX-9501, X-0319, and X-0321 were tested with the aquarium method, and the results are presented. (ERA citation 05:022865)

N80-25367/7 PC **A03**/MF **A01**
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (Germany, F.R.). Inst. fuer Experimentelle Stroemungsmechanik.
Windtunnel Tests of a Tubular Supersonic Inlet for Projectiles.
B. Schaefer. Mar 79, 33p DFVLR-FB-79-26, ESA-TT-645
Text in German; English Summary. Report Will Also Be Announced as Translation (Esa-TT-645).

Measurements were carried out in a trisonic wind tunnel to investigate the sudden increase of drag of a tubular projectile using models with different cowl angles and fineness ratios. The test results show the influence of Mach number, cowl angle, and fineness ratio on the drag coefficient. The Mach number at which the increase in drag occurs is estimated using a simple method.

PAT-APPL-6-144 483 PC **A02**/MF **A01**
Department of the Navy Washington DC
Gelled Slurry Explosive.
Patent Application,
Kenneth Range, William J. Irwin, Russell Reed, Jr., and Wallace E. Silver. Filed 28 Apr 80, 9p AD-D007 236/3
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

An explosive slurry containing red water, a nitrocellulose containing propellant, oxidizer, passivated aluminum and a thickening agent. (Author)

PATENT-4 163 681 Not available NTIS
Department of the Navy Washington DC
Desensitized Explosives and Castable Thermally Stable High Energy Explosive Compositions Therefrom.
Patent,
Julius Rothenstein, and Samuel Goldhagen. Filed 15 Apr 70, patented 7 Aug 79, 9p AD-D007 256/1, PAT-APPL-028 991
Supersedes PAT-APPL-028 991-70.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

This patent describes a novel desensitized explosive wherein a normally sensitive solid explosive material is coated with an effective desensitizing amount of a phlegmatizing agent which contains functional groups reactive with one or more ingredients conventionally used in forming a thermally

stable, crosslinked solid composite explosive. The present invention also includes thermally stable, crosslinked solid composite explosive in which said desensitized explosives are an integral part. Still further this invention includes the method of coating the as-received explosive material with said phlegmatizing agent, preferably in a drying vessel at elevated temperatures. (Author)

PATENT-4 193 297 Not available NTIS
Department of the Navy Washington DC
Infrared Fuze Test Simulator.
Patent,
Gerald N. Plotkin. Filed 31 Jul 63, patented 18 Mar 80, 4p AD-D007 248/8, PAT-APPL-300 409 Supersedes PAT-APPL-300 409-63.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An infrared fuze test simulator for simulating the infrared pattern which would be received by a spinning fuze in flight includes: a stationary mounting adapted to support a fuze having an infrared admission area; a variable high intensity infrared point source spaced from said fuze along the spin axis thereof; means for collimating the infrared radiation given off by said infrared point source into a beam and directing the beam along said spin axis; rotating mirror means between said fuze and said infrared point source and located on said spin axis for reflecting said beam radially outward from said axis and causing said beam to sweep through a circular path around said spin axis; stationary annular mirror means surrounding said rotating mirror means for receiving the beam from the rotating mirror means and directing the radiation upon said infrared admission area of the fuze at a predetermined angle with the fuze axis; means disposed in the path of said beam for attenuating the intensity of said beam; means disposed in the path of said beam for passing a desired wavelength of said beam; and means disposed in the path of said beam for changing the cross-sectional shape and size of said beam.

PATENT-4 194 202 Not available NTIS
Department of the Navy Washington DC
Grid Pulsed Oscillator and Detector.
Patent,
William E. Doyle. Filed 16 Sep 59, patented 18 Mar 80, 7p AD-D007 246/2, PAT-APPL-840 479 Supersedes PAT-APPL-840 479-59.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 %0.50.

A pulse doppler proximity fuze comprising a self-pulsing oscillator for developing a series of radio frequency electromagnetic energy impulses, an antenna electrically connected to said oscillator for radiating said impulses into space and for intercepting reflected impulses thereby to effect a variation in the amplitude of said impulses, a pair of detectors electrically connected to the said oscillator circuit for developing an output signal in proportion to the energy of the said reflected signal during the peak amplitude of said impulse, a thyratron firing circuit said detectors having means for detecting spurious signals and target signals but utilizing only the target for firingthe thyratron firing circuit; and an electroresponsive ignition device electrically coupled to the thyratron firing circuit, said device being ignitable upon actuation of the thyratron firing circuit by said target signal. (Author)

PATENT-4 195 294 Not available NTIS
Department of the Navy Washington DC
Dual Channel Proximity Fuze.
Patent,
John D. Reid. Filed 15 Nov 56, patented 25 Mar 80, 4p AD-D007 245/4, PAT-APPL-622 510 Supersedes PAT-APPL-622 510-56.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A fuze for detonating a projectile i proximity to a target comprising, first normally effective transceiver channel means for effecting radiation of a first electromagnetic signal into space and for receiving electromagnetic signals therefrom, including any portion of said first radiated signal reflected from a target, second transceiver channel means initially ineffective to radiate and receive a signal adapted to being rendered effective for effecting radiation of a second electromagnetic signal into space and for receiving electromagnetic signals therefrom, including any portion of said second radiated signal reflected from a traget, control circuit means for rendering said second channel means effective, and normally non-operating electroresponsive detonating circuit means adapted to being rendered operating by said channel means for detonating said projectile. (Author)

PATENT-4 195 295 Not available NTIS
Department of the Navy Washington DC
Pulse Doppler-Radio Proximity Fuze.
Patent,
John H. Kuck. Filed 14 Jan 59, patented 25 Mar 80, 6p AD-D007 244/7, PAT-APPL-786 899 Supersedes PAT-APPL-786 899-59.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A fuze for exploding projectiles and the like in proximity to a target, comprising, means for generating radio frequency waves, means for propagating said generated waves through the space intervening between the projectile and the target, a portion of said propagated waves being reflected back by said target toward said propagation means, means connected to said propagation means for simultaneously detecting said generated waves, and said reflected waves to provide a signal for firing said fuze, said detecting means being sensitive to said reflected waves only in the presence of said generated waves, a variable impedance connected to said wave generating means, and means for varying said impedance from a relatively high value to a relatively low value thereby terminating the operation of said wave generating means to render said detecting means insensitive both to reflected waves and to spurious waves. (Author)

PATENT-4 196 433 Not available NTIS
Department of the Navy Washington DC
Doppler Frequency Proximity Fuze.
Patent,
Charles B. Brown. Filed 23 Dec 59, patented 1 Apr 80, 4p AD-D007 241/3, PAT-APPL-861 724 Supersedes PAT-APPL-861 724-59.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

Existing proximity fuzes generally utilize the Doppler signal resulting from the relative motion between the fuze, or projectile, and the target to actuate the fuze on close approach to the target. A typical proximity fuze generally consists of an antenna, an oscillator-detector circuit, an audio amplifier circuit, and a thyratron firing circuit. The oscillator generates and radiates an electromagnetic wave, part of which is intercepted by the target and reflected back to the fuze antenna, whereupon a ripple, or beat, signal is developed in the oscillator-detector proportional to the relative velocity between the target and the fuze. The ripple signal is amplified by the audio amplifier and the amplified signal fed to a thyratron firing circuit. When the amplitude of the amplified signal exceeds the initiation potential of the thyratron, an electrical storage device is discharged through a primer device thereby detonating the fuze.

PATENT-4 203 366 Not available NTIS
Department of the Navy Washington DC
FM Fuze Circuit.
Patent,
Gilbert Wilkes. Filed 1 Feb 57, patented 20 May 80, 7p AD-D007 257/9, PAT-APPL-637 846 Supersedes PAT-APPL-637 846-57.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

The present invention relates generally to proximity fuzes for use with guided missiles, and more particularly it pertains to an improved microwave circuit for frequency modulation operation in a proximity fuze. In conventional proximity fuze circuits, an oscillator in the fuzed missile continually emits signals, and upon approaching a target, signal reflection occurs, thus producing a beat frequency between the emitted and reflected signals due to the Doppler frequency shift engendered by the relative motion of fuzed missile and target. In radio proximity fuzes, the intensity of the emitted signal at the target is proportional to the inverse square of the distance from fuzed missile to target, and with the usual relatively small solid angle subtended by the target, the intensity of the reflected signal at the fuzed missile is in turn also proportional to the inverse square, with the result that the intensity of the reflected signal at the fuzed missile is proportional to the product of the two inverse squares, that is, to the inverse fourth power of said distance or range.

SAND-78-1696 PC **A03/MF A01**
Sandia Labs., Albuquerque, NM.
Feasibility Study of a Fail-Safe Through Bulkhead Initiator.
A. C. Schwarz. Mar 80, 34p
Contract EY-76-C-04-0789

The design status of a through bulkhead initiator (TBI) is presented. The TBI design consists of a high explosive donor which when detonated transmits a shock wave through a metal bulkhead to initiate an acceptor explosive without destroying the integrity of the bulkhead. There are at least two potential applications for such a device. The combined requirements of the two applications are severe in several aspects, namely: fail-safe, small size, and controlled function time. The PETN donor output was characterized by velocity interferometer techniques. Two methods of controlling the output were demonstrated: (1) controlling the density of the donor and (2) controlling the length of the donor column (in relationship to the bulkhead thickness). The Type 304L stainless steel bulkhead was designed using a combination of experimental and analytical techniques to assure both function and integrity. The Type 304L provides a single shock rather than a multiple wave structure and exhibits high ductility. The PETN selected for the acceptcr was chosen on the basis of shock sensitivity testing in which the morphology of the explosive and the wave shape of the stimulus entering the explosive played key roles. When tested with a short pulse (40 ns, rectangular), the small particle size PETN initiated at a lower pressure than did the large particle size PETN; when tested with a long pulse (280 ns, triangular), the large particle size PETN initiated at a lower pressure than did the small particle size PETN. (ERA citation 05:021119)

SAND-80-0230/1 PC **A07/MF A01**
Sandia Labs., Albuquerque, NM.
Deflagration-to-Detonation Transition Project. Quarterly Report, June-August 1979.
M. L. Lieberman. Jan 80, 140p
Contract EY-76-C-04-0789

Development of the MC3533 detonator began; a contract was placed for determination of suitable ignition conditions and hardware was fabricated for planned component shock ignition tests. Performance studies were planned to optimize DDT detonator design. The feasibility of utilizing ceramic varistors of several compositions to protect detonators from inadvertent ignition from an electrostatic discharge stimulus was established. Several mixtures of the explosive 2-(5-cyanotetrazolato)pentaamminecobalt-(III) perchlorate (CP) with other constituents were screened as igniter powders for the MC3196A detonator. It was shown that with the spark gap of the MC3423 detonator removed, a voltage in excess of 15 kV is required to fire the device. This establishes the fact that the spark gap provides suitable protection, since its breakdown is at a considerably lower voltage. The output of the MC3423 detonator has been increased by increasing the density and mass of CP in the output column. Electrothermal response testing was performed on MC3423 igniters which had had their bridgewires pressed against the header surface prior to loading. These units easily met all-fire and no-fire goals. Chemical and physical compatibility studies have continued. The coefficient of thermal expansion of CP has been found to be approx. 60 x 10 exp -6 mm/mm-exp 0 C. Impact testing of CP lot 47344 has reconfirmed the conclusion that the material exhibits

greatest sensitivity in the form of unconfined pellets. Photoacoustic spectra were obtained for CP, its precursors, and known reaction products. Continuing studies of CP analogs showed that none of the analogs examined in confined pellet form is as sensitive to ignition from an electrostatic discharge as is CP. NMR spectra were obtained of loosely packed CP and its solution in DMSO. Optical measurements of CP (1.3 Mg/m exp 3) DDT by fiber optic techniques yielded a stable deflagration rate of 0.54 km/s and transition at approx. 8 mu s. (ERA citation 05:022866)

19D. Explosions, Ballistics, and Armor

AD-A085 527/0 PC **A03**/MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
12823A LANCE Missile Number 3717, Round Number 343 ECL, 11 April 1980.
Meteorological data rept.
Apr 80, 32p Rept no. ERADCOM/ASL-DR-1143

Meteorological data gathered for the launching of the 12823A LANCE, Missile Number 3717, Round Number 343 ECL are presented in tabular form.

AD-A085 529/6 PC **A02**/MF **A01**
Army Electronics Research and Development Command White Sands Missile Range NM Atmospheric Sciences Lab
12822A LANCE Missile Number 4362, Round Number 346-ECL, 2 May 1980.
Meteorological data rept.
May 80, 18p Rept no. ERADCOM/ASL-DR-1145

Meteorological data gathered for the launching of the 12822A LANCE, Missile No. 4362, Round No. 346-ECL, are presented in tabular form.

AD-A085 581/7 PC **A04**/MF **A01**
H-Tech Labs Inc Santa Monica CA
Nuclear Airblast Simulation Using Fuel-Air Explosives.
Final rept. Dec 76 - Dec 78,
B. A. Hartenbaum. 31 Dec 78, 67p DNA-4839F, AD-E300 787
Contract DNA001-77-C-0101

Airblast effects and airblast simulation at overpressures less than 100 psig are reviewed and the use of fuel-air mixtures as an explosive driver for a nuclear airblast simulator is evaluated. Methods for dispersing fuel are presented and estimates are made on the use of fluid jets to create explosive fuel-air mixtures. Calculations are made of the reach, dispersion, and detonability of long range fuel jets. Experimental fuel-air data are analyzed. It is concluded that small-scale experiments have demonstrated the feasibility of using liquid jets to create a hemispherical detonable cloud (at least in the small), but that scaling to 1 KT from 1/4 ton experiments is very uncertain. Intermediate-scale experiments appear necessary. Simulator criteria are reviewed. Certain issued involving underwater shock and ground shock in addition to airblast are clarified.

AD-A085 713/6 PC **A05**/MF **A01**
Naval Postgraduate School Monterey CA
Combat Damage Assessment Team A-10/GAU-8 Low Angle Firings versus Individual Soviet Tanks.
Special rept. Feb-Mar 78,
R. H. S. Stolfi, J. E. Clemens, and R. R. McEachin. Aug 79, 90p Rept no. NPS56-79-005

This report describes firings of the A-10/GAU-8 weapon system against individual combat loaded Soviet main battle tanks. The pilots making the firing passes attacked at low altitude and corresponding low dive angles simulating movement through a hostile air defense system. Ammunition used in the attacks comprised 30mm armor piercing incendiary rounds, which proved to be effective damage agents against substantial areas of the Soviet T-62 tanks used as targets. The pilots in six successful firing passes (one additional pass resulted in a miss) scored 95 impacts on target, which included 17 perforations through the armored envelope. The six tanks which were impacted received damage physically assessed as ranging from catastrophic in the case of two combat vehicles to negligible in the case of one tank attacked directly from the front. (Author)

AD-A085 716/9 PC **A03**/MF **A01**
Army Armament Research and Development Command Aberdeen Proving Ground MD Ballistics Research Lab
Numerical Solution of the Azimuthal-Invariant Thin-Layer Navier-Stokes Equations.
Final rept.,
Charles J. Nietubicz, Thomas H. Pulliam, and Joseph L. Steger. Mar 80, 37p ARBRL-TR-02227, AD-E430 444

A numerical procedure is developed for a two-dimensional azimuthal (or planar) invariant form of the thin-layer Navier-Stokes equations. The governing equations are generalized over the usual two-dimensional and axisymmetric formulations by allowing non-zero velocity components in the azimuthal direction. The equations are solved with an implicit approximate factorization finite-difference scheme. Inviscid and viscous results are presented for both external and internal flows, for spinning and non-spinning bodies.

AD-A085 718/5 PC **A02**/MF **A01**
Army Armament Research and Development Command Aberdeen Proving Ground MD Ballistics Research Lab
Standardization of Muzzle Blast Overpressure Measurements.
Final rept.,
James Patterson, George A. Coulter, Joel Kalb, George Garinther, and Benjamin Mozo. Apr 80, 17p ARBRL-SP-00014, AD-E430 446

This report details the findings and recommendations of the working group concerning test procedures, instrumentation, and reporting guide for muzzle blast overpressure measurements. The recommendations will enable test directors to correlate data at different sites of proof testing.

AD-A085 774/8 PC **A04**/MF **A01**
Admiralty Underwater Weapons Establishment Portland (England)
A Mathematical Model of Water Entry.
Technical note,
A. M. Mackey. Oct 79, 51p AUWE-TN-636/79, DRIC-BR-71835

A computer simulation of the water entry of an axisymmetric body with or without a cruciform tail and with or without a parachute delivery system is described. The predictions of the simulation are shown to agree with experimental observations of water entry motion. The Fortran program which implements this model is listed. (Author)

19E. Fire Control and Bombing Systems

AD-A085 799/5 PC **A15**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Engineering
Cooperative Estimation of Targets by Multiple Aircraft.
Master's thesis,
Ralph S. Bryan. Jun 80, 331p Rept no. AFIT/GE/EE/80-5

A cooperative estimator of aerial target motion was designed and evaluated using an Extended Kalman Filter and a Monte-Carlo simulation. The estimator was designed to combine tracking information from two cooperating fighter aircraft which are tracking a single aerial target in either range and angle, or in angle-only. The cooperation occurs when information, in the form of raw measurements or state estimates, is transferred between aircraft via a telemetry link. The design and evaluation were both preliminary in the sense that necessary information about attackers' relative position and orientation was assumed error-free, that transmission delays and other details of a data link were not included, tracker errors were modeled as white noise, and timing and word-length constraints of actual real-time filter software was not addressed.

PAT-APPL-6-115 844 PC **A03**/MF **A01**
Department of the Air Force Washington DC
Gun Simulator System.
Patent Application,
Ralph E. Wick. Filed 28 Jan 80, 27p AD-D007 295/9
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A gun simulator system which is capable of safely simulating any airborne gun. The simulation takes into account not only aircraft approach but also preselected range and bullet trajectory. In so doing, the gun simulator system records hits both on the ground and in the aircraft for each pass. In addition, the simulator system is readily adaptable for use with already existing simulator programs. (Author)

PAT-APPL-6-150 874 PC **A02**/MF **A01**
Department of the Navy Washington DC
Semiconductor Laser Alignment Device.
Patent Application,
Don F. Shaw. Filed 19 May 80, 14p AD-D007 240/5
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A semiconductor laser alignment device for aiming a laser light beam, broadcast by a weapon, along an optical light path such that the laser light beam is in alignment with the aiming direction of the weapon at a target which is located a predetermined distance from the weapon. The semiconductor laser alignment device comprises a tubular housing attached to the barrel of the weapon, a laser diode located within the tubular housing for broadcasting the laser light beam, and a projecting lens for collimating the laser light beam broadcast by the laser diode. Zeroing means connected to the laser diode positions the laser diode such that the laser light beam broadcast by the laser diode is in alignment with the line of sight of the weapon. (Author)

19F. Guns

AD-A085 608/8 PC **A02**/MF **A01**
Army Armament Research and Development Command Dover NJ Cost Analysis Div
A Study of Relative Cost of Army Towed Howitzers and Commercial Construction Equipment.
Final rept. for 1979,
T. J. Breen. Jan 80, 21p Rept no. ARSEC-80-1

Compares Towed Howitzer Cost to Construction Equipment on a per pound basis. Rate of inflation on Army equipment vis a vis Commercial Construction equipment. Develops a Cost Estimating Relationship for Howitzers based upon weight. (author)

AD-A085 717/7 PC **A04**/MF **A01**
Army Armament Research and Development Command Aberdeen Proving Ground MD Ballistics Research Lab
Role of the Insulating Layer from TiO2-Wax Liner in Reducing Gun Tube Wear.
Technical rept.,
J. Richard Ward, and Timothy L. Brosseau. Apr 80, 54p ARBRL-TR-02238, AD-E430 449

Adoption of wear-reducing liners into the 105 mm M392 APDS projectile increased the wear life of the M68 cannon from 100 to 400 rounds for polyurethane foam and 10,000 rounds for TiO2-wax. Heat transfer measurements on the M68 tank cannon concluded the additives reduced heat input and the efficiency of the TiO2-wax rested with the presence of flaps and an insulating deposit formed with successive firings of TiO2-wax rounds. To test the hypothesis the insulating residue contributes to design additives, a 1200-round firing test was conducted in which 600 APDS and 600 HEP rounds were fired alternatively. Based on wear per round established for APDS and HEP rounds, one would have expected 0.19mm of wear for the 1200 rounds. Instead, the 1200-round test produced 1.9 mm of wear establishing the importance of the insulating residue. It was also observed the secondary wear increased for the alternate APDS-HEP round test. This confirms an earlier hypothesis that the secondary wear arises because the additives is not effective down bore. The

total wear of 1.9 mm was twice as much as predicted for a correlation between heat input and wear. It is postulated that the APDS round is more erosive when it is preceded by a low-velocity HEP round than by another APDS round. The extra erosivity of the APDS round is attributed to a thicker oxide layer left on the barrel by the HEP round.

AD-A085 720/1 PC **A05**/MF **A01**
Calspan Corp Buffalo NY
The Role of Oxygen in Gun Barrel Erosion and Cracking. A Shock Tube Gun Investigation.
Final rept. 21 Jun-7 Nov 78,
E. B. Fisher, and C. C. Morphy. Apr 80, 92p
CALSPAN-6343-D-1, ARBRL-CR-00427, AD-E430 450
Contract DAAK11-78-C-0070

Experiments to determine the individual contributors to gun barrel erosion in an oxidizing atmosphere were conducted in the Shock Tube Gun (STG), a ballistic compressor, designed and developed by Calspan Corporation. This facility can compress mixtures of pure gases and can generate flow conditions and cycle times similar to those experienced in large caliber guns. Tests were conducted with a mixture of argon and nitrogen to define the threshold erosion for an inert baseline. Small concentration of oxygen were substituted for nitrogen in the mix to quantify the oxidation effect. Subsequently, tests were conducted with various gas mixtures containing carbon dioxide, which dissociates to produce oxygen when compressed to high temperatures. The basic oxidation effect was observed to be nearly linear increase in erosion with oxygen concentration. A corresponding shift in the erosion threshold to less severe convective heating conditions was observed in response to surface chemistry. A similar effect was observed for carbon dioxide mixture where erosion was correlated in terms of the equilibrium concentration of oxygen at peak pressure. Surface cracking was observed and found to be most severe near the erosion threshold where the oxide layer was thickest. A white layer was observed in tests with oxygen in the absence of carbon dioxide.

AD-A085 723/5 PC **A03**/MF **A01**
Army Armament Research and Development Command Aberdeen Proving Ground MD Ballistics Research Lab
Ignition of NOS 365 Liquid Propellant Containing an Air Bubble under Simulated Breech Pressurization Conditions.
Final rept.,
Vincent M. Boyle, and Edwin A. O'Leary. Apr 80, 42p ARBRL-TR-02236, AD-E430 452

A setback simulator has been used to generate pressure within a liquid propellant (NOS 365) containing a suspended air bubble. The bubble volume was varied from 1 to 200 microliters. Several tests were made using a 1000 microliter air space above the liquid propellant. The maximum test pressure was around 600 MPa and the pressurization rates ranged fom 25 MPa/msec to 800 MPa/msec. The following conclusions were reached: 1. A suspended air bubble makes liquid propellant more sensitive to pressure ignition. 2. The intensity of the reaction appears to increase with bubble size. 3. Higher pressurization rates caused ignition of neat liquid propellant. However, this may be due to extrusion of propellant around the pistons. 4. The impact mode of activator operation, although permitting higher pressures and pressurization rates than the contact mode, also gives more variability in the results.

19H. Underwater Ordnance

PATENT-4 183 301 Not available NTIS
Department of the Navy Washington DC
Induction Ground Mine and Firing Mechanism Therefor.
Patent,
Richard J. Burke, and George Renholt, Jr. Filed 7 Aug 44, patented 15 Jan 80, 19p AD-D007 254/6, PAT-APPL-548 484
Supersedes PAT-APPL-548 484-44.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

In a mine of the character disclosed adapted to be planted on the bed of a body of water from a surface vessel, the combination of a mine casing, a drag plate for the mine adapted to retard the downward movement thereof as the mine descends through the water, means including a line for detachably securing the drag plate to the casing in such a manner as the cause the casing to be righted during the descent of the mine through the water, and means effective when the mine reaches a predetermined depth of submergence for disconnecting the drag plate from the casing.

PATENT-4 185 555 Not available NTIS
Department of the Navy Washington DC
Electrolytic Pressure Sensitive Mechanism.
Patent,
Louis Wilson, and Nelson N. Estes. Filed 11 Jun 53, patented 29 Jan 80, 10p AD-D007 252/0, PAT-APPL-361 102
Supersedes PAT-APPL-361 102-53.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A pressure sensitive submarine mine firing apparatus comprising an electrolytic cell including an orifice electrode communicating said chambers, means for maintaining an ion concentration gradient between said chambers, pressure sensitive means for causing the electrolyte to flow from one chamber to the other chamber through said passage means variably in accordance with the magnitude of the pressure signals applied to the apparatus, means for varying the ion concentration of the electrolyte flowing through said passage means inversely in accordance with the average magnitude of the applied pressure signals, means including said electrode for producing a signal correlative with the quantity and the ion concentration of the electrolyte flowing through said passage means, an electrolytic integrator cell in fluid communication with one of said chambers, a pair of electrodes in said integrator cell, circuit means including a source of potential connecting said orifice electrode and one of the electrodes in said integrator cell whereby the ion concentration of said integrator cell is increased in accordance with the rate of ion flow through said orifice electrode, a second circuit means including a source of potential and a firing relay connecting said pair of electrodes in said integrator cell and means for selectively shunting said relay to thereby vary the magnitude of the pressure signal necessary to actuate the relay. (Author)

PATENT-4 188 905 Not available NTIS
Department of the Navy Washington DC
Mine Sweeping Means.
Patent,
Royal Weller, and Harry S. Jones. Filed 13 Apr 43, patented 19 Feb 80, 8p AD-D007 251/2, PAT-APPL-482 855
Supersedes PAT-APPL-482 855-43.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

In a mechanism for sweeping a pressure controlled mine arranged within a body of water comprising a plurality of water entraining devices, each of said devices comprising a pair of pressure plates, a plurality of bracing members for maintaining the pressure plates of each pair in predetermined fixed space relation with respect to each other, a plurality of flexible tension members interconnecting said pairs of pressure plates whereby the plates are adapted to cause the water entrained between said plates to be moved sufficiently to reduce the pressure of the water adjacent the mine to a predetermined value as the mechanism travels over the mine, and means of causing movement of said mechanism above the mine. (Author)

PATENT-4 193 346 Not available NTIS
Department of the Navy Washington DC
Electrolytic Pressure Mechanism.
Patent,
Alton D. Anderson, and Nelson N. Estes. Filed 16 Mar 53, patented 18 Mar 80, 14p AD-D007 268/6, PAT-APPL-342 762
Supersedes PAT-APPL-342 762-53.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A vessel detecting apparatus comprising means responsive to the time varying negative pressure signal produced by the passage of a vessel in proximity to the detecting apparatus for producing an electrical signal having a time varying amplitude correlative with the square root of pressure signal, means for integrating said electrical signal over the interval of the negative pressure signal duration, and utilization means responsive to the time integral of said electrical signal. (Author)

20. PHYSICS

20A. Acoustics

AD-A085 666/6 PC **A06**/MF **A01**
Utah Univ Salt Lake City Dept of Computer Science
A Constant Percentage Bandwidth Transform for Acoustic Signal Processing.
Technical rept.,
James E. Youngberg. Jan 80, 122p Rept no. UTEC-CSC-80-004
Contract N00173-79-C-0045, ARPA Order-3301

This paper describes a constant percentage bandwidth transform for acoustic signal processing. Such a transform is shown to emulate behavior found in the human auditory system. A synthesis transformation is developed which, when cascaded with the absence of spectral modification. The effects of spectral domain modification are described. Principles governing discrete implementation of the transform pair are discussed, and relationships are formalized which specify minimal sample requirements for the spectral domain. The Constant-Q spectral magnitude and phase functions are discussed, and three main methods are evaluated whereby the spectral phase may be unwrapped. Finally, the use of the transform pair is discussed in the solution of the perception-related problem of time scale compression and expansion of speech. (Author)

AD-A085 764/9 PC **A04**/MF **A01**
Illinois Univ At Urbana-Champaign Coordinated Science Lab
Scattering Matrix Analysis of Surface Acoustic Wave Reflectors and Transducers.
Doctoral thesis,
Carl Michael Panasik. Feb 80, 70p Rept nos. R-873, UILU-ENG-80-2205
Contracts F19628-78-C-0040, N00014-79-C-0424

The phased periodic array scattering parameters have been modified and corrected for use as a single electrode, mixed units, scattering matrix consisting of one electrical and two acoustic ports. These scattering parameter analytical expressions are functions of material constants, electrode geometry, and frequency. The three port single electrode scattering matrices are acoustically cascaded to produce a three port device scattering matrix which takes into account all finger interactions (acoustic and electric) for the combined effects of piezoelectric and mechanical scattering. The analysis agrees well with experimental measurements of input admittance, electro-acoustic transfer function, and acoustic transmission and reflection coefficients as functions of frequency. Analysis results for the complete modeling of transducers with floating electrodes are also presented. (Author)

N80-26116/7 PC **A04**/MF **A01**
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (Germany, F.R.). Abteilung Technische Akustik.
Optimization of Noise Barriers.
D. Lohmann. Dec 78, 64p DFVLR-FB-79-29, ESA-TT-648
Text in German; English Summary. Report Will Also Be Announced as Translation (Esa-TT-648).

The effect of sound barriers on the reduction of noise emitted from the jet engines was studied. The Fresnel-Kirchhoff diffraction integral was solved for sound sources with arbitrary intensity patterns. It is shown that an amplifying effect can arise due to diffraction at the edges of the barrier.

20B. Crystallography

DESY-SR-79/10 PC **A02**/MF **A01**
Deutsches Elektronen-Synchrotron, Hamburg (Germany, F.R.).
Mean Square Relative Displacements of Nearest Neighbour Atoms in Ge.
P. Rabe, G. Tolkiehn, and A. Werner. Jun 79, 8p
U.S. Sales Only.

From EXAFS spectra of crystalline and amorphous Ge we have determined the mean square relative displacements sigma exp 2 of nearest and next nearest neighbour atoms in the temperature range 80 K to 400 K. A strong correlation of the nearest neighbour motion is observed for c-Ge. This correlation decreases in a-Ge. The results are compared with calculations performed within the Debye approximation. The structural parameters of a-Ge are consistent with a continuous random network approach. (Atomindex citation 11:495546)

N80-26177/9 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Formation and Transformation of Polytypes in MX2 Compounds.
V. K. Agrawal. May 80, 12p INPE-1735-RPE/135 Revised. Proposed for Presentation at 6TH Intern. Conf. On Crystal Growth, Moscow, 10-16 Sep. 1980.

On the basis of a review of experimental studies made on single crystals of PbI2, CdI2 and CdBr2, it is shown that the high polytypes in a substance are formed as a matter of chance in the initial stages of the growth of crystals and they are in the metastable state, therefore, transform generally into a basic type during growth/on annealing. As regards to formation of a basic type, the ionicity of the compound is found to have a direct influence in determining which of the closely related structures should be formed. On the basis of polytypic structures of CdI2 and PbI2, it is found that the second and third neighbors anion-anion layer interactions dominate the interlayer interactions during growth/transformation of polytypes. A criterion for the occurrence of Zhdanov number 3 in Zhdanov symbols of a crystal structure (only at places where the sum of the numbers occurring before it is an odd number) is evolved which would help in the determination of structures of high polytypes of CdI2 and PbI2.

N80-26181/1 PC **A03**/MF **A01**
Maryland Univ., College Park. Dept. of Physics and Astronomy.
Solid State Crystal Physics at Very Low Temperatures.
Annual Report.
W. Davis, K. Krack, J. P. Richard, and J. Weber. Apr 80, 38p NASA-CR-163240
Grant NSG-7196

The properties of nearly perfect crystals was studied at cryogenic temperatures. A large Helium 3 and Helium 4 dilution refrigerator has been assembled, and is described. A cryostat suitable for cooling a 35 liter volume to .020 Kelvin was designed and constructed, together with instrumentation to observe the properties of nearly perfect crystals.

PAT-APPL-6-143 562 PC **A03**/MF **A01**
Department of the Navy Washington DC
Semiconductor Composition.
Patent Application,
James D. Jensen, and Richard B. Schoolar. Filed 25 Apr 80, 48p AD-D007 233/0
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A variable temperature method for the preparation of single and multiple epitaxial layers of single-phase (e.g., face-centered cubic), ternary lead chalcogenide alloys (e.g., lead cadmium sulfide, (Pb sub 1-w Cd sub w) a (S) sub 1-a wherein w varies between zero and fifteen hundredths, inclusive, and a=0.500 + or - 0.003), deposited upon substrates of barium fluoride, BaF2, maintained in near thermodynamic equilibrium with concurrently sublimated lead alloy and chalcogenide sources. During preparation, the temperature of the substrate is varied, thereby providing an epilayer with graded composition and predetermined electrical and optical properties along the direction of growth. This growth technique can be used to produce infrared lenses, narrowband detectors, and double heterojunction lasers. (Author)

PAT-APPL-6-143 694 PC **A03**/MF **A01**
Department of the Navy Washington DC
Graded Gap Semiconductor Detector.
Patent Application,
James D. Jensen, and Richard B. Schoolar. Filed 25 Apr 80, 40p AD-D007 234/8
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A variable temperature method for the preparation of single and multiple epitaxial layers of single-phase (e.g., face-centered cubic), ternary lead chalcogenide alloys (e.g., lead cadmium sulfide, (Pb sub 1-w Cd sub w) a (S) sub 1-a wherein w varies between zero and fifteen hundredths, inclusive, and a=0.500 + or - 0.003), deposited upon substrates of barium fluoride, BaF2, maintained in near thermodynamic equilibrium with concurrently sublimated lead alloy and chalcogenide sources. During preparation, the temperature of the substrate is varied, thereby providing an epilayer with graded composition and predetermined electrical and optical properties along the direction of growth. This growth technique can be used to produce infrared lenses, narrowband detectors, and double heterojunction lasers. (Author)

PAT-APPL-6-143 695 PC **A03**/MF **A01**
Department of the Navy Washington DC
Growth Technique for Preparing Graded Gap Semiconductors and Devices.
Patent Application,
James D. Jensen, and Richard B. Schoolar. Filed 25 Apr 80, 40p AD-D007 235/5
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A variable temperature method for the preparation of single and multiple epitaxial layers of single-phase (e.g., face-centered cubic), ternary lead chalcogenide alloys (e.g., lead cadmium sulfide, pb sub 1-w cd sub w (s) sub 1-a wherein w varies between zero and fifteen hundredths, inclusive, and a=0.500 + or - 0.003), deposited upon substrates of barium fluoride, BaF2, maintained in near thermodynamic equilibrium with concurrently sublimated lead alloy and chalcogenide sources. During preparation, the temperature of the substrate is varied, thereby providing an epilayer with graded composition and predetermined electrical and optical properties along the direction of growth. This growth technique can be used to produce infrared lenses, narrowband detectors, and double heterojunction lasers. (Author)

20C. Electricity and Magnetism

AD-A085 338/2 PC **A02**/MF **A01**
Harvard Univ Cambridge MA Gordon McKay Lab
Surface Currents and Charges on a Cross Formed by an Electrically Thick Cylinder and a Flat Plate in a Normally Incident Plane-Wave Field,
R. W. P. King, D. J. Blejer, and R. W. Burton. 25 Oct 78, 12p AFOSR-TR-80-0285
Contract F29601-75-C-0119, Grant AFOSR-76-3073
Pub. in Radio Science, v14 n5 p753-763 Sep-Oct 79.

No abstract available.

AD-A085 388/7 PC **A02**/MF **A01**
Air Force Geophysics Lab Hanscom AFB MA
Emission of Particles from a Charged Sphere into a Magnetic Field,
Christopher Sherman. 7 May 79, 4p Rept no. AFGL-TR-80-0171
Pub. in Jnl. of Applied Physics, v51 n3 p1294-1296 Mar 80.

No abstract available.

UCRL-84044 MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Computational Methods for Reversed-Field Equilibrium.
J. K. Boyd, S. P. Auerbach, P. A. Willmann, H. L. Berk, and B. McNamara. 15 Apr 80, 41p CONF-800456-1
Contract W-7405-ENG-48
Sherwood theory meeting, Tucson, AZ, USA, 23 Apr 1980.
Microfiche copies only.

Investigating the temporal evolution of reversed-field equilibrium caused by transport processes requires the solution of the Grad-Shafranov equation and computation of field-line-averaged quantities. The technique for field-line averaging and the computation of the Grad-Shafranov equation are presented. Application of Green's function to specify the Grad-Shafranov equation boundary condition is discussed. Hill's vortex formulas used to verify certain computations are detailed. Use of computer software to implement computational methods is described. (ERA citation 05:023315)

20D. Fluid Mechanics

AD-A085 199/8 PC **A03**/MF **A01**
Defence Research Establishment Suffield Ralston (Alberta)
Die Swell for Newtonian Fluids.
Technical note,
C. L. Chenier, and G. A. Hill. May 80, 28p Rept no. DRES-TN-477

The swelling and shrinking of Newtonian jets issuing from circular orifices or slits has been examined. Equations predicting die swell ratio and downstream flow characteristics are developed. The scatter of experimental data has been studied and the factors contributing to this phenomenon are presented. The die swell ratios and jet shapes versus Reynolds numbers for Newtonian liquids are empirically shown. (Author)

AD-A085 225/1 PC **A03**/MF **A01**
General Applied Science Labs Inc Westbury NY
R2D2 - A Fortran Program for Two-Dimensional Chemically Reacting, Hyperthermal, Internal Flows. Volume I. Method of Analysis.
Final rept. 15 May 78-30 Sep 79,
John Erdos, Gabriel Miller, Robert Ray, and Gertrude Weilerstein. Jan 80, 50p GASL-TR-254-VOL-1, AFFDL-TR-79-3162-VOL-1
Contract F33615-78-C-3016

The theoretical formulation and method of analysis employed in the development of the Fortran Program R2D2 is described. The program is capable of solving the two dimensional (planar or axisymmetric) internal flow of a chemically reacting and/or vibrationally excited mixture of gases in a nonequilibrium or equilibrated state. The local Mach number at the entrance and exit stations of the duct may be either subsonic or supersonic, although an arc-driven expanding flow, consisting of a subsonic reservoir, a transonic throat, and a supersonic expansion, is presumed to be the configuration of primary interest. Discontinuites in wall slope are admissible. The axisymmetric formulation includes a swirl component of velocity, in addition to the axial and radial components, which may be significant in swirl-stabilized arc facilities. The current version of R2D2 incorporates a thermochemical data package for an 8 species, 10 chemical reaction model of high temperature air, including ionization and vibrational excitation. However, the number of species and reactions is only limited by considerations of computer storage and running time, which can be formidable.

AD-A085 391/1 PC **A02**/MF **A01**
Colorado Univ At Boulder
On the Boundary Conditions Imposed by a Stratified Fluid,
Jean Latour, and Jean-Paul Zahn. 2 Nov 77, 9p AFGL-TR-80-0104
Contract F19628-77-C-0104
Pub. in Geophysical and Astrophysical Fluid Dynamics, v10 p311-318 1978.

No abstract available.

AD-A085 418/2 PC **A02**/MF **A01**
Rensselaer Polytechnic Inst Troy NY Dept of Mathematical Sciences

Stability of a Stokes' Layer of a Dusty Gas,
Donald A. Drew. 24 Jul 78, 7p
Contract N00014-76-C-0187
Pub. in Physics of Fluids, v22 n11 p2081-2086 Nov 79.

No abstract available.

AD-A085 485/1 PC **A02**/MF **A01**
Royal Aircraft Establishment Farnborough (England)
An Investigation Into the Real Gas Effects of Cryogenic Nitrogen In Inviscid Homentropic Flow.
Technical memo.,
C. M. Albone. May 79, 20p RAE-TM-AERO-1805, DRIC-BR-68895

As a contribution to the investigation of the suitability of using cryogenic nitrogen as the test gas in a high Reynolds number transonic wind-tunnel, a study is made here of the real gas effects of nitrogen at low temperatures. The study, which is limited to inviscid, homentropic flow of an non-conducting gas, takes the form of an independent confirmation of results by Kilgore et al. A recent paper by Wagner and Schmidt on this subject employs a different equation of state from that used here and their investigations cover more than just homentropic flow. The new contribution in this Memorandum is that the use of a simplified equation of state enables an expression for enthalpy (and hence the terms in Bernoulli's equation) to be derived by analytic integration.

AD-A085 493/5 PC **A02**/MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Chemistry
Nonlinear Transport Processes: Hydrodynamics,
I. Oppenheim, and R. D. Levine. 24 Jul 79, 23p AFOSR-TR-80-0396
Grant AFOSR-77-3135
Pub. in Physica A, v99 p383-402 1979.

No abstract available.

AD-A085 514/8 PC **A04**/MF **A01**
Montana State Univ Bozeman Supersonic Wind Tunnel Lab
Necessary Conditions for Transition in a Free Shear Layer.
Rept. for 1 Aug 79-31 Jan 80,
Anthony Demetriades. Feb 80, 57p SWT-80-1, AFOSR-TR-80-0442
Contract F49620-79-C-0210

A necessary condition for the preservation of turbulence has been utilized to predict laminar-turbulent transition in free shear, or mixing, layers. Following earlier applications in wakes and boundary layers, the condition is expressed in terms of a threshold turbulence Reynolds number which can be computed if the turbulence properties of the post-transitional flow are known. Assuming that the latter are those reported for self-similar flows, general rules for transition in all major types of shear flows are drawn. Numerical computations are presented for arbitrary homogeneous free shear layer transition identified as the most forward permissible turbulence onset location. Transition is found to move downstream very rapidly as the fast-stream Mach number is increased and the speed ratio is decreased, and less rapidly as the slow stream is heated. Agreement with available transition data is qualitatively good but quantitatively fair, which is ascribed to missing information about the shear layer turbulence and the observed tendency of available transition data to depend on the Reynolds number. (Author)

AD-A085 672/4 PC **A03**/MF **A01**
Ohio State Univ Research Foundation Columbus
Fluid Dynamics of Multiple Nozzle Arrays and Radial Flow Diffusers.
Final rept. 1 Oct 77-31 Dec 79,
S. L. Petrie, and J. D. Lee. Apr 80, 28p AFOSR-TR-80-0456
Grant AFOSR-76-2956

This report summarizes the theoretical and experimental research dealing with the fluid dynamical interactions in free shear layers and diffuser-ejectors. The objectives of this research were (a) to provide characterization of the fluid dynamical mixing layers typical of those in supersonic transfer lasers and in mixing gas dynamic lasers, and (b) to examine the mixing and induction characteristics of ejectors capable of providing pressure ratios typical of those associated with radial flow laser diffusers. (Author)

INKA-Conf-79-302-001 PC **A02**/MF **A01**
Karlsruhe Univ. (Germany, F.R.).
Determination of Local Frequency Distribution of Particle Velocities in Disperse Two-Phase-Flow Using a Laser-Doppler-Velocimeter (LDV).
A. Stuemke. 1979, 17p CONF-7909125-1
In German.European symposium and 3. exhibition on particle characterisation. 218. event of the European Federation of Chemical Engineering, Nuernburg, F.R. Germany, 24 Sep 1979.
U.S. Sales Only.

Laser-Doppler velocimetry is a suitable method for measuring the local velocity of individual particles in a disperse gassolid flow. A representative local particle velocity distribution can be obtained for a particle system with a given particle size distribution, provided the particle velocities for all particle size classes are likewise recorded by counting and analyzing single LD-bursts. A 'repressentative'esentative measurement is of special importance in case any correlation exists between particle velocity and particle size. An LDV-system meeting the above specification will be described. Based on the results of extensive experimental work on LD-signal quality for particle sizes between 20 and 300 mu m, the measuring system can be adapted in accordance with various particulate properties. The effects of the adaptation parameters are schematically discussed. Measurements in a vertical gas-solids pipe flow show the usefulness of the suggested method. With the knowledge of the complete local particle velocity distributions an advantage in interpreting special flow phenomena exists. (Atomindex citation 11:500087)

N80-25298/4 PC **A04**/MF **A01**
Computational Mechanics Consultants, Knoxville, TN.
An Interaction Algorithm for Prediction of Mean and Fluctuating Velocities in Two-Dimensional Aerodynamic Wake Flows.
Final Report.
A. J. Baker, and J. A. Orzechowski. Jul 80, 70p NASA-CR-3301, COMCO-80-TR-1.0
Contract NAS1-14855

A theoretical analysis is presented yielding sets of partial differential equations for determination of turbulent aerodynamic flowfields in the vicinity of an airfoil trailing edge. A four phase interaction algorithm is derived to complete the analysis. Following input, the first computational phase is an elementary viscous corrected two dimensional potential flow solution yielding an estimate of the inviscid-flow induced pressure distribution. Phase C involves solution of the turbulent two dimensional boundary layer equations over the trailing edge, with transition to a two dimensional parabolic Navier-Stokes equation system describing the near-wake merging of the upper and lower surface boundary layers. An iteration provides refinement of the potential flow induced pressure coupling to the viscous flow solutions. The final phase is a complete two dimensional Navier-Stokes analysis of the wake flow in the vicinity of a blunt-bases airfoil. A finite element numerical algorithm is presented which is applicable to solution of all partial differential equation sets of inviscid-viscous aerodynamic interaction algorithm. Numerical results are discussed.

N80-25301/6 PC **A07**/MF **A01**
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (Germany, F.R.). Inst. fuer Theoretische Stroemungsmechanik.
Hypersonic Slip-Flow around Slender Elliptic Cones at a Slight Angle of Attack.
Ph.D. Thesis - Technische Univ., Aachen.
P. Evangelou. May 79, 126p DFVLR-FB-79-21, ESA-TT-644
Text in German; English Summary. Report Will Also Be Announced as Translation (Esa-TT-644).

A method is developed for calculating the hypersonic flow around slender elliptic cones at a slight angle of attack. The main equations are derived from the Navier-Stokes equations and energy conservation. The resulting system of partial parabolic differential equations is solved using an explicit finite difference scheme. A comparison is made with experimental data and other theoretical investigations.

N80-25586/2 PC **A02**/MF **A01**
Drexel Univ., Philadelphia, PA. Dept. of Physics and Atmospheric Science.
Feasibility Studies for Light Scattering Experiments to Determine the Velocity Relaxation of Small Particles in a Fluid.
Final Report, Jan. 1979 - May 1980.
C. Acquista, and L. M. Narducci. May 80, 18p NASA-CR-163214
Grant NSG-2357

An approach for measuring the non-Markoffian component in the relaxation mechanism of a Brownian particle is proposed which combines desirable features of both the shock wave experiment and conventional light scattering experiments. It is suggested that the radiation pressure generated by a C.W. laser be used to guide an individual spherical particle to terminal velocity. At an appropriate time, the beam intensity is suddenly lowered to a value at which the radiation pressure is negligible, and the ensuing velocity relaxation is measured directly.

PB80-808546 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Adiabatic Gas Flow. 1970-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1970-Apr 80,
Robert Hippler. May 80, 167p
Sponsored in part by National Technical Information Service, Springfield, VA.

This bibliography covers research performed on adiabatic gas flows for planetary and stellar atmospheres, aerodynamics, heat transfer, nozzles, turbines, and energy systems, such as MHD and fusion reactors. This comprehensive bibliography covers analytical and modeling techniques, characteristics, experimental data, and fundamental principles. Topics cover two and three dimensional, compressible and incompressible gas dynamic flows, for unbounded and bounded, stable and unstable conditions. (Contains 76 citations)

PB80-808553 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Adiabatic Gas Flow. 1964-April, 1980 (Citations from the International Aerospace Abstracts Data Base).
Rept. for 1964-Apr 80,
Robert Hippler. May 80, 88p
Sponsored in part by National Technical Information Service, Springfield, VA.

This bibliography covers worldwide literature on adiabatic gas flows for planetary and stellar atmospheres, aerodynamic, heat transfer, nozzles, turbines, and energy systems, such as MHD and fusion reactors. This comprehensive bibliography covers analytical and modeling techniques, characteristics, experimental data, and fundamental principles. Topics cover two and three dimensional, compressible and incompressible gas dynamic flows, for unbounded and bounded, stable and unstable conditions. (Contains 83 citations)

UCRL-82867 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
On the Spurious Pressures Generated by Certain GFEM Solutions of the Incompressible Navier-Stokes Equations.
R. L. Sani, P. M. Gresho, and R. L. Lee. 15 Oct 79, 15p CONF-800613-4
Contract W-7405-ENG-48
International conference on finite element in flow problems, Banff, Alberta, Canada, 10 Jun 1980.

The spurious pressures and acceptable velocities generated when using certain combinations of velocity and pressure approximations in a Galerkin finite element discretization of the primitive variable form of the incompressible Navier-Stokes

equations are analyzed both theoretically and numerically for grids composed of quadrilateral finite elements. Schemes for obtaining usable pressure fields from the spurious numerical results are presented for certain cases. (ERA citation 05:021039)

20E. Masers and Lasers

AD-A084 903/4 PC **A04**/MF **A01**
Naval Postgraduate School Monterey CA
A Model for Laser Produced Material Surface Evaporation.
Master's thesis,
Geoffrey Lance Travers. Mar 80, 73p

This study is to assess the feasibility of using a laser's radiation to remove masses on the order of milligrams from a target surface and to form a vapor jet which could then serve as the conducting channel in a giant power pulse discharge. A model based on an energy balance is presented which predicts the mass removed and the pressure, density and temperature of the material as it propagates from the target surface as functions of the pulse time and the absorbed power density. Combinations of laser pulse time and power density are considered for which the surface temperature remains low enough in order to avoid cut-off by a plasma plume in front of the target surface. A model of adiabatic jet expansion is presented to predict the radial expansion of the vapor plume as it propagates in the axial direction. Temperature, pressure and density are predicted after radial expansion using the model of adiabatic jet expansion. These models predict, theoretically, that the desired masses and limits on vapor plume expansion can be achieved using relatively low power densities for the proposed experiment. (Author)

AD-A085 017/2 PC **A02**/MF **A01**
Foreign Technology Div Wright-Patterson AFB OH
Pulse Laser Ranging Systems.
Zdenko Adelsberger. 23 Apr 80, 23p Rept no. FTD-ID(RS)T-0180-80
Edited trans. of Vojnotehnicke Glasnik (Yugoslavia) v26 n6 p767-776 1978.

No abstract available.

AD-A085 334/1 PC **A02**/MF **A01**
Rochester Univ NY Dept of Physics and Astronomy
Effect of Mode Competition on Beam Divergence in a Ring Laser,
Surendra Singh, and L. Mandel. 4 Sep 79, 3p
AFOSR-TR-80-0278
Grant AFOSR-76-2918
Pub. in Jnl. of the Optical Society of America, v70 n2 p252-253 Feb 80.

No abstract available.

AD-A085 401/8 Not available NTIS
Joint Inst for Lab Astrophysics Boulder CO
Models of High-Power Discharges for Metal-Xe Excimer Lasers,
R. Shuker, A. Gallagher, and A. V. Phelps. 20 Aug 79, 15p Rept no. JILA-110
Availability: Pub. in Jnl. of Applied Physics, v51 n3 p1306-1320 Mar 80 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A085 456/2 PC **A03**/MF **A01**
Avco Everett Research Lab Inc Everett MA
Excimer Laser Research.
Mid-term rept. 16 Nov 77-15 May 78,
J. H. Parks, and D. Klimek. 15 May 78, 37p
Contract N00014-75-C-0063, DARPA Order-1806

This mid-term report describes theoretical and experimental investigations of the mercury monohalides. These molecules show great promise for achieving high power scalable laser action in the visible portion of the spectrum. The report includes an analysis of formation kinetics; theoretical calculations of the mercury halide radiative lifetimes; and an experimental determination of the heavy particle quenching of HgX(B) by mercury atoms. (Author)

AD-A085 491/9 PC **A02**/MF **A01**
California Univ Berkeley Dept of Chemistry
Rotational Laser Emission by HF in the CIF-H2 Chemical Laser,
Enrique Cuellar, and George C. Pimentel. 27 Dec 78, 9p AFOSR-TR-80-0393
Grant AFOSR-78-3535
Pub. in Jnl. of Chemical Physics, v71 n3 p1385-1391, 1 Aug 79.

No abstract available.

AD-A085 519/7 PC **A03**/MF **A01**
Avco Everett Research Lab Inc Everett MA
Excimer Laser Research.
Quarterly rept. 16 Nov 78-15 Feb 79,
J. H. Parks. 15 Feb 79, 42p
Contract N00014-75-C-0063, DARPA Order-1806

This quarterly report describes experimental investigations of interhalogen molecules. These molecules are under consideration to achieve high power scalable laser action in the near UV and visible portion of the spectrum. The report includes a description of fluorescence experiments for these molecules and an analysis of formation kinetics. A theoretical model has been developed to describe the excited ion-pair state structure of the interhalogens. The predictions of this theory are borne out by fluorescence experiments. (Author)

AD-A085 520/5 PC **A07**/MF **A01**
Avco Everett Research Lab Inc Everett MA
Excimer Laser Research.
Final technical rept. 15 Aug 74-29 Sep 79,
J. H. Parks. 1979, 150p
Contract N00014-75-C-0063, DARPA Order-1806

This final report describes theoretical and experimental investigations of the rare gas monohalides, halogens, mercury monohalides and interhalogen molecules. These molecules show great promise for achieving high power scalable laser action in the near UV and visible portion of the spectrum. The report includes a description of fluorescence and lasing experiments for these molecules; an analysis of formation kinetics; and theoretical calculations of rare gas metastable photoionization and the mercury halide radiative lifetimes. A theoretical model has been developed to describe the excited ion-pair state structure of the rare gas halides and interhalogens. The predictions of this theory are borne out by fluorescence experiments. (Author)

AD-A085 707/8 PC **A07**/MF **A01**
Air Force Inst of Tech Wright-Patterson AFB OH School of Engineering
Comparison of Control Methods in a Frequency Stabilized Laser.
Master's thesis,
Robert D. Luzitano. Jan 80, 138p Rept no. AFIT/GE/EE/80-2

The purpose of this research is to compare two types of control methods that can be used to frequency stabilize a laser. The first method uses a single piezoelectric transducer (PZT) to control the cavity length of a helium-neon laser. The second method employs dual PZT controllers of different lengths so that a fast response time can be achieved with the benefit of a large dynamic range. Two variations of the first method are compared to the second method. The first variation uses an integrator with gain as a compensator in electronic feedback control loop and is designed using steady state analysis. The second variation uses a more sophisticated compensator that is designed using frequency analysis. Frequency analysis is also used in the compensator design for the second method. Each compensator is tested in a laser control loop and the results of each method are compared. (Author)

AD-A085 783/9 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Effects of Narrow-Free-Spectral-Range Etalons of Mode-Locked Lasers.
Journal article,
Stephen R. Chinn. 8 Aug 79, 5p JA-5001, ESD-TR-80-10
Contract F19628-80-C-0002
Pub. in Optics Communications, v31 n3 p359-362 Dec 79.

No abstract available.

AD-A085 789/6 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Ultraviolet Solid-State Ce:YLF Laser at 325 nm.
Journal article,
Daniel J. Ehrlich, Richard M. Osgood, Jr., and Peter F. Moulton. 1 Mar 79, 4p JA-4949, ESD-TR-80-1
Contract F19628-80-C-0002
Pub. in Optics Letters, v4 n6 p184-186 Jun 79.

No abstract available.

AD-A085 795/3 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Broadly Tunable cw Operation of Ni;MgF2 and CO:MgF2 Lasers.
Journal article,
Peter F. Moulton, and Aram Mooradian. 17 Aug 79, 4p JA-4987, ESD-TR-80-7
Contract F19628-80-C-0002
Pub. in Applied Physics Letters, v35 n11 p838-840, 1 Dec 79.

No abstract available.

AD-A085 796/1 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Development of a High-Repetition-Rate Mini-TEA CO2 Laser.
Journal article,
Norman Menyuk, and Peter F. Moulton. 10 Sep 79, 6p JA-5027, ESD-TR-80-14
Contract F19628-80-C-002
Pub. in Review of Scientific Instruments, v51 n2 p216-220 Feb 80.

No abstract available.

AD-A085 805/0 PC **A02**/MF **A01**
Joint Inst for Lab Astrophysics Boulder CO
Research in Laser Processes.
Semiannual rept. 1 Aug 78-31 Jan 79,
A. V. Phelps, and A. C. Gallagher. 8 Feb 80, 18p
Contract N00014-76-C-0123, ARPA Order-2683

Measurements have been made of the electrical and optical properties of electrical discharges in Mg-Xe mixtures at moderate current densities (50-100 A/cm to the 2nd power) and high Xe pressures (1 to 5 atmospheres). Preliminary analyses indicate a rather low electron and excitation temperature resulting from unexplained large energy losses. Efforts to obtain the high excitation temperatures required for efficient, high power excimer laser operation will continue. An experiment is being designed to provide effective rate coefficients for electron excitation and deexcitation of excited mercury atoms so as to provide data necessary for the modeling of the contribution of these states to the production of upper laser levels and to the growth of ionization and instabilities in discharge excited lasers. This experiment will use laser induced perturbation of the excited state densities and optical observation of the relaxation of excited state densities.

N80-25656/3 PC **A03**/MF **A01**
Stuttgart Univ. (Germany, F.R.). Inst. fuer Plasmaforschung.
High Repetition Rate Electro-Optic Q-Switching of Nd(3+):YAG Lasers Showing Strong Optical Birefringence.
C. H. Chang, K. Hirsch, and H. Salzmann. 1979, 33p IPF-79-6
Submitted for Publication.

Using a configuration of two coupled resonators, electro-optic Q switching of CW pumped Nd(3+):YAG lasers was investigated. This technique yields two linearly polarized output beams with practically all the power contained in one beam. In the case of strong pumping, e.g., using high repartition rate flashlamp pumping, the optimization of mirror reflectivity leads to a single resonator configuration. As some applications make use of only one component of polarization, such as laser scattering diagnostics of thermonuclear plasmas, the usefulness of concentrating the available laser power into one linearly polarized output beam is shown.

PAT-APPL-6-137 045 PC **A02**/MF **A01**
Department of the Navy Washington DC
Laser Beam Linear Adjustable Integrating Mirror.
Patent Application,

Thomas R. Tucker. Filed 3 Apr 80, 8p AD-D007 229/8
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

An adjustable linear integrating mirror for producing spatially uniform beam areas of high power lasers. The mirror is formed by a plurality of thin solid rectangular blocks made of a highly reflective metal with one thin face ground to a flat mirror finish. The blocks are assembled one upon the other with their mirror faces in alignment and held together at their ends by strips of spring steel. Wedge-shaped spacers are inserted between their free ends opposite the mirrored face to produce small angular rotations of each mirrored block. The spring steel should have sufficient tension to secure the wedges in place; however, if necessary, clamps may be used to hold the back ends together to secure the wedges in place. The angular setting of the mirrored blocks will determine the amount of overlay of the reflected laser beam. Fine tuning for a specific overlay may be performed by varying the depth of the wedges which varies the angular setting of each mirrored block section.

PAT-APPL-6-150 040 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Pasadena Office, CA.
Coherently Pulsed Laser Source.
Patent Application,
J. S. Margolis. Filed 15 May 80, 12p N80-24602/8, NASA-CASE-NPO-15111-1
Contract NAS7-100
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

An electronically controllable apparatus is described which modulates a continuous wave laser beam so as to produce an output beam consisting of coherent 'pulses' that are electronically controllable as to both pulse repetition rate and pulse width. The apparatus includes two acoustic devices positioned so that the laser beam passes through them in sequence, and an apparatus for passing sound waves through the devices to frequency shift the laser radiation as well as to diffract it. Each acoustic device generates sound waves containing a group of frequencies which result in spaced pulses. The spreading of a laser beam which emanates from the first acoustic device is countered by the second acoustic device to produce a collimated, coherently pulses, laser beam.

PB80-194384 Not available NTIS
National Bureau of Standards, Washington, DC.
Models of High-Power Discharges for Metal-Xe Excimer Lasers.
Final rept.,
R. Shuker, A. Gallagher, and A. V. Phelps. Mar 80, 15p
Contracts N00014-76-C-0123, DOE-EA-77-A-01-6010
Pub. in Jnl. of Applied Physics 51 n3 p1306-1320 Mar 80.

High-power (about 10 to the 8th power W/l) discharges in metal-doped Xe are modeled for typical metal atom densities of 10 to the 15th power-10 to the 17th power/cc and Xe densities of about 10 to the 20th power/cc, and electron densities of 10 to the 14th power-10 to the 17th power/cc as appropriate for proposed excimer lasers. Na is used as a prototype species, while its properties are varied to indicate some of the changes that could result from the use of different metals. The model includes sixteen excited levels of Na, three ionic species, the excimer levels of NaXe, and Na2. The degree of ionization is determined by collisional multistep excitation and ionization of excited atoms versus dissociative recombination of electrons with Na2(+). Steady-state conditions in the positive column are calculated for typical gas temperatures of about 0.06 eV and electron temperatures T(e) of 0.3-0.5 eV.

PB80-812928 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Gas Dynamic Lasers. 1964-June, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Jun 80,
Brian Carrigan. Jul 80, 264p
Supersedes NTIS/PS-79/0839 and NTIS/PS-78/0829.

The citations cover research on kinetic and energy transfer processes, design, optics, nozzles, and performance of gas and chemical lasers relying on gas dynamic effects for lasing enhancement. Diffusion and flow studies specifically applicable to such lasers are also included. (This updated bibliography contains 253 citations, 6 of which are new entries to the previous edition.)

UCRL-Trans-11567 PC **A02**/MF **A01**
Compagnie Electro-Mecanique, Paris (France).
Supply of Faraday Rotators by Rotating Machines.
Jan 80, 24p
Contract W-7405-ENG-48
Translation source information not available.

The multiplication of the number of chains necessary for the creation of high-power laser pulses implies a multiplication of the number of Faraday rotators that have to be interposed in the beams. Considering the geometrical dimensions of those devices and the inductions that are required, the energies that have to be installed to supply them quickly become large. The rotators are magnetized by discharging banks of slow capacitors. That results in bulky installations having a complex structure and requiring elaborate monitoring and control of the equipment. The possibility of replacing the capacitor banks by electrical rotating machines whose momentum supplies the energy needed to magnetize the Faraday rotators of 18 chains was studied. The study is directed toward the use of ordinary rotating machines whose performance characteristics and reliability have been proved in industrial equipment and which consequently do not require any special development. (ERA citation 05:022809)

20F. Optics

AD-A084 748/3 PC **A03**/MF **A01**
Colorado Univ At Boulder Electromagnetics Lab
A Hybrid Method for Paraxial Beam Propagation in Multimode Optical Waveguides.
Technical rept.,
David C. Chang, and Edward F. Kuester. Jan 80, 36p SCIENTIFIC-54, ARO-15632.3-EL
Grant DAAG29-78-G-0173

A hybrid (non-ray, non-modal) method for computing the fields of a paraxial beam propagating in a multimode waveguide (parallel-plate or dielectric slab) at large axial distances is presented. The method is based on the Fourier and Fresnel self-imaging properties of these waveguides, and is capable of high accuracy. The method is much more efficient than ray or mode approaches, while giving complete field information which coupled-powers equations do not provide. (Author)

AD-A085 104/8 PC **A03**/MF **A01**
Naval Postgraduate School Monterey CA
Aero-Optics at Shorter Wavelengths.
Progress rept. Dec 79-Mar 80,
Allen E. Fuhs. Mar 80, 30p Rept no. NPS67-80-003
Contract MIPR-80-MP-084

Using the optical system equation, the impact of a change in wavelength is determined. The rms phase variation at output aperture is critical and must be reduced by an amount equivalent to reduction in wavelength. If turret size is scaled with wavelength, the distortion due to the inviscid flow remains constant. Decreased wavelength offers the flexibility of greatly reduced turret weight, volume, and aerodynamic drag. Multiple turrets become feasible on an aircraft. The distortion due to the turbulent boundary layer becomes magnified by reduction of wavelength; however, if the turbulent boundary layer originates on the turret and if the turret is scaled, the boundary layer thickness decreases. Distortion becomes less significant in this case. (Author)

AD-A085 122/0 PC **A03**/MF **A01**
Royal Aircraft Establishment Farnborough (England)
The Propagation of Focussed Truncated Laser Beams in the Atmosphere.
Technical memo.,
A. G. Purcell. Jun 79, 31p RAE-TM-MATH-COMP-7903, DRIC-BR-70928

Lutomirski's graphical results concerning the intensity distribution of a focussed laser beam in the presence of turbulence have been confirmed and extended to include annular apertures. We have also considered segmented apertures and present some indication of the likely improvement in focal intensity when the segments are optimally adjusted to counteract turbulence. (Author)

AD-A085 219/4 PC **A02**/MF **A01**
Environmental Research Inst of Michigan Ann Arbor
Computer Generated Holographic Optics.
Final rept. 1 Apr 77-31 Mar 80,
James R. Fienup. May 80, 23p ERIM-128600-12-F, ARO-14582.2-EL
Contract DAAG29-77-C-0017

The goal of this research was to theoretically and experimentally investigate the use of computer-generated holograms in the design and fabrication of holographic optical elements (holographic lenses or diffraction optics). Conventional design of holographic lenses had previously been limited to spherical recording beams, and more recently to recording beams formed by conventional optical systems. The utilization of computer-generated holograms in the recording beams allows a completely arbitrary specification of the recording wavefronts in the hologram plane, making possible a hologram lens of higher performance (lower aberrations) than previously possible. We refer to an interferometrically recorded hologram lens having a computer-generated hologram in a recording beam as a computer-originated holographic lens. We studied the basic limitations of computer-generated holograms, and integrated the analysis of computer-generated holograms and computer-originated holographic optical elements into ERIM's holographic optical analysis and design (HOAD) ray-tracing computer program. In addition, we designed, fabricated, and tested an optical system using a computer-generated hologram and a computer-originated holographic lens. (Author)

AD-A085 366/3 PC **A02**/MF **A01**
GTE Sylvania Inc Mountain View CA Electro-Optics Organization
Simultaneous Stimulated Raman Scattering and Optical Frequency Mixing in Lithium Iodate,
E. O. Ammann. 11 Dec 78, 4p AFOSR-TR-80-0287
Contract F49620-78-C-0077
Pub. in Applied Physics Letters, v34 n12 p838-840, 15 Jun 79.

No abstract available.

AD-A085 405/9 PC **A03**/MF **A01**
ITT Electro-Optics Div Roanoke VA
Single-Mode Bend Evaluations. Addendum,
G. Salisbury. 15 May 80, 31p Rept no. ITT-80-20-06-ADD
Contract N00173-78-C-0196
Addendum to Final Rept.

This test is designed to find the bend-induced losses of four fibers. Three of these fibers are of the high numerical aperture (NA) design, and one fiber is of the low NA design.

AD-A085 409/1 PC **A02**/MF **A01**
Aerospace Corp El Segundo CA Aerophysics Lab
Interference Patterns Produced By a Mach-Zehnder Interferometer and A Multiline HF Laser.
Interim rept.,
R. W. F. Gross, J. G. Coffer, E. B. Turner, R. A. Chodzko, and W. R. Warren, Jr. 10 Apr 80, 22p TR-0080(5764)-2, SD-TR-80-17
Contract Fo4701-79-C-0080, DARPA Order-3646

The fringe pattern produced by a Mach-Zehnder interferometer illuminated with the light from a hydrogen fluoride (HF) laser operating on a large number of laser lines was investigated. Emphasis was placed on the intensity variations of the infrared fringes that are observed when one element of the interferometer is translated, thereby changing the length of one optical path. An intensity maximum similar to 'white-light fringes' is observed

when the two arms of the interferometer have equal optical lengths. The experimental results are compared with numerically predicted fringe patterns calculated from the spectral content of the illuminating laser beam. A method is suggested for actively controlling the phases of a number of parallel HF laser amplifiers in high-power phased-array devices. (Author)

AD-A085 451/3 PC **A02**/MF **A01**
Scripps Institution of Oceanography La Jolla CA Visability Lab
Daytime Visibility, A Conceptual Review,
Jacqueline I. Gordon. Nov 79, 25p SIO-REF-80-1, SCIENTIFIC-11, AFGL-TR-79-0257
Contract F19628-78-C-0200

Daytime visibility is defined as the distance a black object can be seen against the horizon sky. Data on visual thresholds for daylight illumination are examined and the degradation of the contrast by the atmosphere described. The visibility as reported in meteorology correlates well with a contrast threshold of 0.05 and thus the attenuation coefficient and threshold sighting range product is equal to 3 alpha gamma equal to 3. Psychophysical data on visual thresholds for 0.33 second glimpse times when corrected to confident viewing with a 4 degree uncertainty of target position, predict the visibility distances well and indicate that the meteorological observers are using targets subtending on the average about 7.6 minutes of arc. Visibilities have an uncertainty of approximately + or - 20 percent in relation to measured physical parameters of air clarity. The errors in visibility distance inherent in the use of non-black targets and backgrounds other than the horizon sky are delineated. Some of the physical methods of measuring air clarity are described with reference to their use in obtaining a measure of visibility. (Author)

AD-A085 476/0 PC **A03**/MF **A01**
Naval Research Lab Washington DC
Magneto-Optic Materials for Biasing Ring Laser Gyros.
Interim rept. no. 2,
G. A. Prinz, J. J. Krebs, W. G. Maisch, and D. W. Forester. 14 Apr 80, 47p NRL-MR-4198, AD-E000 425
See also rept. no. NRL-MR-3870 dated Apr 78, AD-A063 074.

A series of new materials including alloys of transition metals (Fe, Co) with rare earths (Gd, Tb) have been fabricated and characterized. Analysis is provided of ellipsometric techniques used to obtain the magneto-optic properties. An improved definition of Figure-of-Merit for transverse Kerr effect mirror application.

AD-A085 531/2 PC **A02**/MF **A01**
Air Force Geophysics Lab Hanscom AFB MA
Interferometer Design and Data Handling in a High-Vibration Environment. Part I. Interferometer Design,
Ronald P. Walker, and John D. Rex. 1980, 5p
Rept no. AFGL-TR-80-0078-PT-1
Pub. in SPIE, v191 p88-91 1979.

No abstract available.

AD-A085 787/0 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Least-Squares Wave Front Errors of Minimum Norm.
Journal article,
Jan Herrmann. 11 Jun 79, 9p JA-4975, ESD-TR-80-3
Contract F19628-80-C-0002
Pub. in Jnl. of the Optical Society of America, v70 n1 p28-33 Jan 80.

No abstract available.

AD-A085 790/4 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Efficient Infrared ac Kerr Switches using Simple Cryogenic Liquids.
Journal article,
Steven R. J. Brueck, and Helge Kildal. 21 May 79, 4p JA-4960, ESD-TR-80-2
Contract F19628-80-C-0002
Pub. in Applied Physics Letters, v35 n9 p665-667, 1 Nov 79.

No abstract available.

N80-26140/7 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Eigenvalues for Unstable Resonators with Slightly Misaligned Strip Mirrors.
C. Santana, and L. B. Felsen. May 80, 17p INPE-1738-RPE/137-REV
Revised. Submitted for Publication.

Very small misalignments in unstable strip resonators may cause detachment of the low loss eigenmode at lower equivalent Fresnel number, N sub eq, and introduce different periodicities into the eigenvalue curve as a function of N sub eq. Using the resonance equation developed previously from waveguide mode theory, this behavior is explained in physical terms by coupling between mode fields with even and odd symmetry, which are uncoupled in the perfectly aligned configuration. A simplified explicit equation derived for the eigenvalues of the detached mode is found to predict correctly the periodicities of the eigenvalue oscillations. The waveguide method continues to provide an explicit and reliable procedure for rapidly locating the maxima and minima of the detached mode eigenvalues over broad ranges of N sub eq.

PAT-APPL-6-136 210 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Field Test Unit for Windscreen Optical Evaluation.
Patent Application,
Louis V. Genco. Filed 1 Apr 80, 13p AD-D007 292/6
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The invention is directed to an optical apparatus used to analyze the deleterious optical effects of a windscreen or other transparent body when it is inserted into the path of observation. Optical distortion is measured by noting its effect on a precision pattern projected through the transparent body. The multiple imaging phenomenon appears in the same projected pattern and is generally characterized by asymmetrically distributed images of the fundamental pattern. By polarizing an unpatterned beam of light, and projecting it through the same transparent body, the optical sensor in the apparatus records the birefringence characteristics of the body. To analyze distortion and multiple imaging a beam of light, with the pattern of interest superimposed, is projected through the transparent body to a focus on a retro-reflective screen. A segment of the returning beam is redirected after it again passes through the transparent body, with the new direction being substantially aligned to the axis of an optical sensor. Pattern images and variations in the pattern shape correspond directly to the characteristics of th transparent body. Birefringence is analyzed by polarizing the light beam prior to its first pass through the transparent body. The retro-reflected beam reaching the optical sensor contains a spatial distribution of color corresponding to the birefringence characteristics of the transparent body.

PAT-APPL-6-140 529 PC **A02**/MF **A01**
Department of the Air Force Washington DC
Symmetrical 1:1 Photographic Objective Lens.
Patent Application,
Irving R. Abel. Filed 15 Apr 80, 9p AD-D007 291/8
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A symmetrical 1:1 photographic objective lens system of the Double Gauss type wherein negative lens elements are symmetrically disposed on both sides adjacent the stop, each negative element being a cemented doublet comprising a double convex negative and a positive lens elements. A cemented doublet positive lens component is next positioned at the outside of each of the negative elements and a single positive lens is positioned at the outside of each of the inner positive lens components.

PATENT-4 195 221 Not available NTIS
Department of the Navy Washington DC
Scanning Focused Local Oscillator Optical Heterodyne Imaging System.
Patent,
Steven E. Moran. Filed 3 Jul 78, patented 25 Mar 80, 8p AD-D007 264/5, PAT-APPL-921 663
Supersedes PAT-APPL-921 663-78, AD-D005 512.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

In an optical heterodyne system a first coherent light signal is received upon an ordered array of light responsive elements, and a local oscillator source provides a second coherent light signal, the frequencies of the first and second coherent light signals being different. Mixing apparatus is provided to focus the second coherent light signal upon each of the light responsive elements of the array in a preselected sequence, and scanning apparatus scans the light responsive elements in the same preselected sequence to receive light responsive signals generated by the light responsive elements, each of the light responsive signals being related to the intensity of light impinging upon a different one of the light responsive elements and having a frequency equal to the difference between the frequencies of the first and second coherent light signals. (Author)

PATENT-4 195 311 Not available NTIS
Department of the Navy Washington DC
Coherence Length Gated Optical Imaging System.
Patent,
Steven E. Moran. Filed 28 Aug 78, patented 25 Mar 80, 10p AD-D007 243/9, PAT-APPL-937 655
Supersedes PAT-APPL-937 655-78, AD-D005 515.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

This patent describes an apparatus for providing an image of an object, a diffusive medium being located between the apparatus and the object, the apparatus including a coherent light source for projecting a beam of coherent light through the diffusive medium onto various light reflective parts of the object. The coherence length of the projected beam is preferably very short, and each reflective part of the object is located in one of one or more discrete viewing spaces, the depth of field of the apparatus being equal to the coherence length of the projected light. A photocathode or the like is provided for receiving light reflected back through the diffusive medium from the reflective parts, discrete incremental sections of the photo-cathode responding to received light by generating sets of light responsive signals. Each set corresponds to a different viewing space, and the light responsive signals of a given set represent an image of the light reflective parts of the object which are located in the viewing space to which the given set corresponds. Integrating apparatus is provided to combine the light responsive signals of the sets to provide an image of the object.

PATENT-4 201 468 Not available NTIS
National Aeronautics and Space Administration. Pasadena Office, CA.
Method and Apparatus for Doppler Frequency Modulation of Radiation.
Patent,
J. S. Margolis, D. J. McCleese, M. S. Shumate, and C. H. Seaman. Filed 3 Nov 78, patented 6 May 80, 6p N80-24510/3, PAT-APPL-957 452
Supersedes PAT-APPL-957 452-78, N80-21141 (18 - 11 p 1493). Sponsored by NASA.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

A method and apparatus are described for frequency modulating radiation, such as from a laser, for optoacoustic detectors, interferometers, heterodyne spectrometers, and similar devices. Two oppositely reciprocating cats-eye retroreflectors are used to Doppler modulate the radiation. By reciprocally moving both retroreflectors, the center of mass is maintained constant to permit smooth operation at many Hertz. By slightly offsetting the

axis of one retroreflector relative to the other, multiple passes of a light beam may be achieved for greater Doppler shifts with the same reciprocating motion of the retroreflectors.

PATENT-4 203 654 Not available NTIS
Department of the Air Force Washington DC
Line-of-Sight Stabilization Reflector Assembly.
Patent,
Herbert B. Ellis. Filed 21 Nov 78, patented 20 May 80, 4p AD-D007 275/1, PAT-APPL-962 741 Supersedes PAT-APPL-962 741-78, AD-D005 688.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

An assembly for stabilizing the line-of-sight to a mirror in an optical system. The assembly includes a gimballed mirror that can be driven in angular rotation, so as to compensate for angular motions of the optical system, which would otherwise deleteriously affect line-of-sight stabilization of and to the mirror. The reflecting surface of the mirror maintains the desired position in the optical system during such driven compensatory rotations, as well as being unaffected by imposed undesired mechanical vibrations. The assembly has a high natural rotational frequency, minimal and uniform pivot friction, a selected degree of damping, uniform performance over the operating temperature range, as well as long life. (Author)

PB80-191422 Not available NTIS
National Bureau of Standards, Washington, DC.
NBS Specular Reflectometer-Spectrophotometer.
Final rept.,
V. R. Weidner, and J. J. Hsia. 15 Apr 80, 6p
Pub. in Appl. Opt. 19, n8 p1268-1273, 15 Apr 80.

A specular reflectometer has been constructed and tested for calibrating the reflectance of mirror standards over the 250-2500-nm spectral range. This instrument is a measurement accessory to a reference spectrophotometer. The specular reflectometer is designed to measure mirror reflectances at angles of incidence between 5 and 80 degrees, using both vertically and horizontally polarized radiation. Absolute reflectance measurements are obtained by an optical system, which provides for direct measurement of the incident beam and for the sample mirror reflectance using the same beam. This is accomplished by means of a beam tracking system through which the beam is directed into a signal averaging sphere. The sphere rotates with the beam tracking optics, and the stationary detector views the interior of the sphere. Control of the beam tracking optical system is accomplished by a computer-controlled stepping-motor-driven precision turntable. Uncertainties of the reflectance measurements obtained with this system are estimated to be + or - 0.2% of the measured value.

SAND-80-0554C PC **A02**/MF **A01**
Sandia Labs., Albuquerque, NM.
Miners-Iron Test of Optical Fibers.
R. C. HEckman, J. W. Allen, S. R. Dolce, J. J. Hohlfelder, and E. D. Machin. 1980, 5p CONF-800307-6
Contract EY-76-C-04-0789
Fiber optic in the nuclear environment symposium, Adelphi, MD, USA, 25 Mar 1980.

An experiment is described in which a number of optical fibers will be exposed to nuclear radiation in the Miners-Iron event at the Nevada Test Site. Two polymer clad silicon fibers and a borosilicate clad fiber will experience a dose of several Mrads, while a second set will experience about 0.1 Mrad. Attenuation and luninescence experiments are planned. Optic fibers will also be used for cables. (ERA citation 05:020932)

UCRL-84219 MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Comprehensive Description of Fields in Optical Fibers by Means of the Propagating Beam Method.
M. D. Feit, and J. A. Fleck, Jr. Apr 80, 27p CONF-800430-1
Contract W-7405-ENG-48
Conference on physics of fiber optics, Chicago, IL, USA, 28 Apr 1980.
Microfiche copies only.

The propagating beam method provides a configuration space description of the field in an optical fiber and can also be used to generate all of the information necessary for a complete description of the field in terms of modes. Illustrations are given of the method's capabilities for generating mode eigenfunctions, eigenvalues, and group delays for several index profiles of practical interest. (ERA citation 05:023312)

20G. Particle Accelerators

AD-A084 994/3 PC **A04**/MF **A01**
Spire Corp Bedford MA
Dielectric Guide Controlled Collective Ion Acceleration.
Final rept.
Feb 80, 52p FR-60015, AFWL-TR-77-248, AD-E200 467
Contract F29601-77-C-0081

Experiments performed at Spire and NRL have demonstrated dielectric guide controlled collective ion acceleration. Control of the phenomenon has been established by varying the electron beam parameters or guide geometry. Specifically, it has been shown that: Total electron current must exceed the space charge limit; increasing electron current density increases the ion energy; a minimum electron current density is required; increasing guide length (assuming the electron beam can propagate to the end) increases ion energy; increasing guide radius at constant electron current decreases ion energy; and, the energy or charge deposited per unit area of wall controls the velocity of propagation of the electron beam front and therefore the energy of the ions. NRL VEBA results showed that: Dielectric guide controlled collective ion acceleration is effective at higher electron beam energies; an electron beam with current pinched on axis is more efficient for ion acceleration; and molding the surface of the guide can control the beam front velocity.

ANL-HEP-CP-80-09 PC **A02**/MF **A01**
Argonne National Lab., IL.
ZGS Highlights and Speculations.
T. H. Fields. 1979, 13p CONF-7909111-3
Contract W-31-109-ENG-38
Symposium on the history of the ZGS, Argonne, IL, USA, 13 Sep 1979.

Several examples of unfinished business of the ZGS program are described. These examples cover physics, apparatus, and institutional subjects. Speculations are given about the evolution of these subjects during the 1980's. (ERA citation 05:021063)

BNL-27390 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Nonlinear Interaction of Colliding BEAMS in Particle Storage Rings.
J. C. Herrera, and M. Month. 1979, 23p CONF-791240-1
Contract EY-76-C-02-0016
International conference on nonlinear dynamics, New York, NY, USA, 17 Dec 1979.

When two beams of high energy particles moving in opposite directions are brought into collision, a large amount of energy is available for the production of new particles. However to obtain a sufficiently high event rate for rare processes, such as the production of the intermediate vector boson (Z sub 0 and W exp +-), large beam currents are also required. Under this circumstance, the high charge density of one beam results in a classical electromagnetic interaction on the particles in the other beam. This very nonlinear space charge force, caled the beam-beam force, limits the total circulating charge and, thereby, the ultimate performance of the colliding ring system. The basic nature of the beam-beam force is discussed, indicating how it is quite different in the case of continuous beams, which cross each other at an angle as compared to the case of bunched beams which collide head-on. Some experimental observations on the beam-beam interaction in proton-proton and electron-positron beams are then reviewed and interpreted. An important aspect of the beam-beam problem in storage rings is to determine at what point in the analysis of the particle dynamics is it relevant to bring in the concepts of stochasticity, slow diffusion, and resonance overlap. These ideas are briefly discussed. (ERA citation 05:021089)

CONF-7910119-4 MF **A01**
Oak Ridge National Lab., TN.
Lifetime Measurements on Carbon Stripper Foils.
R. L. Auble, and D. M. Galbraith. 1979, 17p
Contract W-7405-ENG-26
Annual conference of the I.N.T.D.S. Boston, MA, USA, 1 Oct 1979.
Microfiche copies only.

Fabrication of carbon stripper foils and their performance in electrostatic accelerators are described. (ERA citation 05:021065)

CONF-791058-67 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Neutron Cross Section Measurements at ORELA.
J. W. T. Dabbs. 1979, 7p
Contract W-7405-ENG-26
International conference on nuclear cross sections for technology, Knoxville, TN, USA, 22 Oct 1979.

ORELA (Oak Ridge Electron Linear Accelerator) has been for the last decade the most powerful and useful pulsed neutron time-of-flight facility in the world, particularly in the broad midrange of neutron energies (10 eV to 1 MeV). This position will be enhanced with the addition of a pulse narrowing prebuncher, recently installed and now under test. Neutron capture, fission, scattering, and total cross sections are measured by members of the Physics and Engineering Physics Divisions of ORNL, and by numerous guests and visitors. Several fundamental and applied measurements are described, with some emphasis on instrumentation used. The facility comprises the accelerator and its target(s), 10 evacuated neutron flight paths having 18 measurement stations at flight path distances 8.9 to 200 meters, and a complex 4-computer data acquisition system capable of handling some 17,000 32-bit events/s from a total of 12 data input ports. The system provides a total of 2.08 x 10 exp 6 words of data storage on 3 fast disk units. In addition, a dedicated PDP-10 timesharing system with a 250-megabyte disk system and 4 PDP-15 graphic display satellites permits on-site data reduction and analysis. More than 10 man-years of application software development supports the system, which is used directly by individual experiments. 12 figures, 1 table. (ERA citation 05:021054)

CONF-791092-3 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Summary Report on the Oak Ridge 25 MV Tandem Accelerator.
G. D. Alton, J. K. Bair, J. A. Benjamin, J. A. Biggerstaff, and C. M. Jones. 1979, 3p
Contract W-7405-ENG-26
Symposium of northeastern accelerator personnel, Philadelphia, PA, USA, 8 Oct 1979.

Status of the ORNL 25 MV tandem accelerator is given. Topics include: installation; voltage test details; ORNL development activities including stripper foil studies, air-SF sub 6 separation, CAMAC buncher controller, and ion source development. (ERA citation 05:021064)

INIS-mf-4742 PC **A06**/MF **A01**
Norges Almenvitenskapelig Forskningsraad, Oslo.
Scandinavian Countries and CERN'S Large 300 GeV Accelerator. A Study of the Discussions 1963-1971.
A. O. Steine. 1977, 103p
In Norwegian.
U.S. Sales Only.

Following introductory chapters on the theme, the source material, the history, organization and functioning of CERN and the place of nuclear research in the scientific research political landscape of the Scandinavian countries, the preliminary basis for the new 300 GeV synchroton, that it be sited else-

where than in Switzerland, is presented. The discussion as to whether Norway should offer a site is presented, and the reasons for the governments decision to do so are given. The Swedish offer is also discussed. The discussions and attitudes in Sweden, Norway and Denmark to the first project are presented in turn, and their reasons for following the British rejection are given. The revised project is also described, and the discussions on this in the three countries are treated in turn. A chapter also describes Finland's relationship to CERN. In the final chapter certain aspects in, e.g., the motivation of participants in the discussions are treated. (Atomindex citation 11:500555)

LA-8271-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Computer Program to Fit a Hyperellipse to a Set of Phase-Space Points in as Many as Six Dimensions.
E. A. Wadlinger. Mar 80, 14p
Contract W-7405-ENG-36

A computer program that will fit a hyperellipse to a set of phase-space points in as many as 6 dimensions was written and tested. The weight assigned to the phase-space points can be varied as a function of their distance from the centroid of the distribution. Varying the weight enables determination of whether there is a difference in ellipse orientation between inner and outer particles. This program should be useful in studying the effects of longitudinal and transverse phase-space couplings. (ERA citation 05:021055)

LA-8289-MS PC **A02**/MF **A01**
Los Alamos Scientific Lab., NM.
Radial Focusing and Space Charge in an Alternating-Phase-Focusing Linac.
S. Inagaki. Mar 80, 13p
Contract W-7405-ENG-36

Using the strong focusing theory for the phase-energy space, it is possible to find the space-charge limit of an Alvarez linac or to find the appropriate combination of the synchronous phases for an alternating-phase-focusing (APF) linac. In a linac design, it is common to use the integral form to compute the transverse dynamics. This report will show that the use of the differential form and of the periodicity condition gives the space-charge term and the appropriate combination of the synchronous phases for the radial oscillation. (ERA citation 05:021057)

LA-8290-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Longitudinal Capture in the Radio-Frequency-Quadrupole Structure.
S. Inagaki. Mar 80, 32p
Contract W-7405-ENG-36

The radio-frequency-quadrupole (RFQ) linac structure not only can attain easily transverse focusing in the low-beta region, but also can obtain very high capture efficiency because of its low beta-lambda and low-particle rigidity. An optimization study of the zero space-charge longitudinal capture in an RFQ linac that yields configurations with large capture efficiency is described. (ERA citation 05:021058)

PPPL-1651 PC **A02**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Phased Waveguide Array with Fixed Tuning Elements.
R. W. Motley, S. Bernabei, W. M. Hooke, and F. J. Paoloni. Apr 80, 24p
Contract EY-76-C-02-3073

The waveguide grill excites both penetrating lower hybrid waves and surface plasma waves. Quarter wavelength tuning elements attached to the sides of a twin waveguide are shown to reduce the surface wave component by a factor of approx. 3.. (ERA citation 05:021520)

20H. Particle Physics

AD-A084 863/0 PC **A07**/MF **A01**
Army Military Personnel Center Alexandria VA
The Z2/A Dependence in Heavy-Ion Fusion for the Reactions of Chlorine on Thulium, Lutetium, Tantalum and Tungsten.
Final rept.,
Anthony Charles DiRienzo. Jun 80, 139p
Master's thesis.

Evaporation residues produced in the reactions 35Cl+169Tm and 37Cl+169Tm, 175Lu, 181Ta and 186W were observed at zero degree utilizing the Mass Inst of Tech.- Brookhaven Nat'l Lab Recoil Mass Spectrometer. The recoiling nuclei were separated from the beam and refocused onto a surface barrier detector by a combination of electrostatic and magnetic fields and magnetic quadrupole lenses. The residual nuclei are alpha radioactive and can thus be identified by a characteristic alpha line observed after the arrival pulse of the evaporation residue. The recoiling nuclei also pass through a gas ionization chamber whereas the decay alpha do not. A separate anti-coincidence spectrum therefore displayed the alphas background free. Trends of evaporation residue cross section were charted versus Z sq (proton no.)/A(atomic no.) and compared to statistical evaporation codes. (Author)

AD-A084 967/9 MF **A01**
Stevens Inst of Tech Hoboken NJ Dept of Physics
Study of the Anatomy of the X-Ray and Neutron Production Scaling Laws in the Plasma Focus (Particle Energy Spectrum and Optimization Criteria).
Final technical rept. 1 Oct 78-30 Sep 79,
V. Nardi, W. H. Bostick, and W. Prior. Nov 79, 41p SIT-P2002-1179, AFOSR-TR-80-0411
Grant AFOSR-75-2754
Availability: Microfiche copies only.

Optimum conditions for plasma focus operations have been experimentally analyzed in terms of (A) The fine structure of the axial-current channel during maximum of compression. (B) Correlation coefficient, for neutron yield n (by D2 discharges) and the multiplicity of the electron beam pulses; (C) Different values of the electrode voltage. The current distribution near the axial plasma column during the explosive decay of the column has been monitored and correlated with the electron beam production. Plasma focus discharges by our mode of operation generate high-intensity neutron beams (approximate 100,000 amp) with a > or approximate 300-keV-peaked spectrum and electron beams, with an energy distribution similarly peaked at 300-400 keV. The energy spectrum is determined by two independent methods (time of flight and target-damage data). The spectrum varies from shot to shot but the main features are observed in all discharges. In each discharge we observe on a time interval of 100-300 nanosec a sequence of beam pulses (1-10), with the same multiplicity of the peak in the rate of change (dI/dt) of the electrode current I. The filamentary structure of the electron beam and the internal structure of the filament have been analyzed with a space resolution better than approximate 1 micrometers. (Author)

AD-A085 639/3 PC **A06**/MF **A01**
Harry Diamond Labs Adelphi MD
The Gluckstern-Hull Formula for Electron-Nucleus Bremsstrahlung.
Technical rept.,
Howard E. Brandt. May 80, 120p Rept no. HDL-TR-1884

The Gluckstern-Hull formula for the electron-nucleus bremsstrahlung cross section, containing the emitted photon angular dependence with the recoil electron angular dependence integrated out, is shown to be correct. This formula is required to calculate continuum x-ray spectra radiated from anisotropic relativistic beam-plasma systems. (Author)

CEA-CONF-4426 PC **A02**/MF **A01**
CEA Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette (France). Dept. de Physique Nucleaire.
Low Energy Pion-Deuteron Interactions.
B. Saghai. 1978, 10p
U.S. Sales Only.

Differential cross sections of pi exp +- d elastic scattering and pi exp + d non radiative capture at 47 MeV for forward angles are given and compared with theoretical calculations and other measurements. (Atomindex citation 11:496162)

CEA-CONF-4454 PC **A02**/MF **A01**
CEA Centre d'Etudes de Bruyeres-le-Chatel, Montrouge (France).
Systematics of (N,2N) Reaction Cross Sections for Separated Isotope Series.
J. Frehaut, and J. Jary. 1978, 6p CONF-780921-17
In French.Conference on neutron physics and other applied purposes, Harwell, UK, 25 Sep 1978.
U.S. Sales Only.

(n,2n)cross sections have been measured between threshold and 15 MeV for the even isotopes of Se, Nd, Sm and for the main isotopes of Gd, W, Tl and Pb. For a given excess energy above the reaction threshold sigma(n,2n), on the average, is an increasing function of the mass number A, and is lower for an odd-N isotope than for the adjacent even isotopes. Strong angular momentum and shell effects are observed for Tl and Pb isotopes and for 209Bi. Calculations using a spin and parity independant statistical model are in agreement with experiment for Nd and Sm isotopes, but are very sensitive to the choice of the level densities. (Atomindex citation 11:495992)

CEA-CONF-4468 MF **A01**
CEA Centre d'Etudes de Bruyeres-le-Chatel, Montrouge (France).
Effects of Non-Axial Deformations on Neutron Scattering from exp 76 Se, exp 78 Se and exp 196 Pt.
J. P. Delaroche. 1978, 6p CONF-780921-16
In French.Conference on neutron physics and other applied purposes, Harwell, UK, 25 Sep 1978.
U.S. Sales Only. Microfiche copies only.

The consequence of triaxial nuclear shapes on the neutron cross section expectations is studied. It is shown that such shapes allow to explain the behavior at backward angles of exp 76 Se, exp 78 Se inelastic scattering angular distrbutions measured at 8 MeV neutron energy. In addition it is shown that for exp 196 Pt the non-axial nuclear deformations may alter strongly the calculated total cross section below 300 keV. (Atomindex citation 11:495980)

CNRS-CPT-78-P-1013 PC **A02**/MF **A01**
Centre National de la Recherche Scientifique, Marseille (France). Centre de Physique Theorique.
Connection Between the Geometrical Method and the Spectral Transformation Method in Scattering Theory.
E. Mourre. Jun 78, 8p
In French.
U.S. Sales Only.

A new method has been introduced for proving the asymptotic completeness in the case of potential scattering. This method was founded on geometrical concepts. A link is established between this method and the spectral transformation method. (Atomindex citation 11:495390)

CNRS-CPT-78-P-1016 PC **A03**/MF **A01**
Centre National de la Recherche Scientifique, Marseille (France). Centre de Physique Theorique.
Quality for Quantum Free Fields.
P. Leyland, J. Roberts, and D. Testard. Jul 78, 43p
U.S. Sales Only.

A proof is given concerning duality for the free neutral scalar boson field (abstract duality). Then real subspaces of a complex Hilbert space and the Von Neumann algebra associated with real subspaces are considered. Lastly duality for free fields (free electromagnetic field and free scalar field of any mass) is studied. (Atomindex citation 11:495385)

CNRS-CPT-78-P-1017 PC **A02**/MF **A01**
Centre National de la Recherche Scientifique, Marseille (France). Centre de Physique Theorique.
Variational Principle for Quasi-Local Algebras over the Lattice.
A. Kishimoto. Jun 78, 14p
U.S. Sales Only.

It is shown that a variational principle holds for certain quasi-local algebras over the lattice. (Atomindex citation 11:495383)

CNRS-CPT-78-P-1019 MF **A01**
Centre National de la Recherche Scientifique, Marseille (France). Centre de Physique Theorique.
Signature for W Boson Production from Jet Analysis in E exp + E exp - Implies W exp + W exp - Implies Hadrons.
M. Perrottet. Jun 78, 12p

U.S. Sales Only. Microfiche copies only.

The ratio sigma (e exp + e exp - implies W exp + W exp - implies Hadrons)/sigma(e exp + e exp - implies gamma .Z implies Hadrons) as a function of the CM energy in the Weinberg-Salam model is computed. For a conservative value of sin exp 2 thetasub(W) (approximately 1/4), this ratio is found to be of the order of one. In that case the expected four-jet structure of the final hadronic events can be a clean signature of the real W exp + W exp - production. The interesting possibility that Msub(Z) > 2 Msub(W) is also discussed. (Atomindex citation 11:495861)

CONF-780876-6 PC **A02**/MF **A01**
Georgia Univ., Athens.
Calculation of Meson Radii in the Geometrical Model.
T. T. Chou. 1978, 8p
Contract EY-76-S-09-0946
Meeting on frontier of physics, Singapore, Japan, 14 Aug 1978.

The radii of the pions and the kaons are computed with the geometrical model of hadron-hadron collisions using the recently published meson-proton scattering data at 200 GeV. Estimated errors are also given. (ERA citation 05:021401)

CONF-791058-70 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Evaluated Data Collections from ENSDF.
W. B. Ewbank. 1979, 3p
Contract W-7405-ENG-26
International conference on nuclear cross sections for technology, Knoxville, TN, USA, 22 Oct 1979.

For several years the Nuclear Data Project has been maintaining an Evaluated Nuclear Structure Data File (ENSDF), which is designed to include critically evaluated values for most nuclear spectroscopic quantities. The information in ENSDF is the same as in the Nuclear Data Sheets, which illustrates two particular output formats (drawings and tables). Spectroscopic information for nuclei with A < 45 is put into ENSDF from the evaluations of Aizenberg-Selove and of Endt and van der Leun. An international network was organized to provide regular revisions of the data file. Computer facilities were developed to retrieve collections of evaluated data for special calculations or detailed examination. (ERA citation 05:021414)

CONF-800329-1 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Light-Particle Emission in Reactions Induced with Carbon and Oxygen Ions.
F. Plasil, J. R. Beene, and R. L. Ferguson. 1980, 7p
Contract W-7405-ENG-26
Workshop on nuclear dynamics, Tahoe City, CA, USA, 17 Mar 1980.

Preliminary results are presented from three different experiments in which light particles emitted during the course of heavy-ion-induced reactions have been studied. The three experiments involved measurements of energies, angular correlations, and multiplicities of neutrons or alpha particles emitted in coincidence with deeply inelastic products or with evaporation residue produced as follows: (1) neutrons from reactions of exp 16 O with exp 93 Nb at 12.9 MeV/u; (2) alphas produced in the same system; and (3) neutrons produced in exp 12 C reactions with exp 158 Gd and in exp 13 C reactions with exp 157 Gd at about 12.4 MeV/u. (ERA citation 05:021428)

CONF-800329-2 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Distribution of Products in the Reaction exp 20 Ne + Al.
R. L. Ferguson, A. I. Gavron, F. E. Obenshain, F. Plasil, and R. L. Robinson. 1980, 5p
Contract W-7405-ENG-26
Workshop on nuclear dynamics, Tahoe City, CA, USA, 17 Mar 1980.

The measurement and preliminary analysis of the distribution of products with Z between 2 and 21 and A between 3 and 43 from 118- and 167-MeV reactions of exp 20 Ne with Al are reported. Experimental conditions were adequate to allow resolution of individual isotopes over this entire range, and measurements were made at several angles for each bombarding energy. Measured relative cross sections of the heavier products were compared with predictions of a statistical-model evaporation calculation. The overall agreement between experiment and theory was rather good; however, certain discrepancies between calculation and experiment for low Z and A at 167 MeV may be troublesome. 3 figures. (ERA citation 05:021421)

COO-2439-6 PC **A02**/MF **A01**
State Univ. of New York at Albany. Dept. of Physics.
Measurement and Analysis of Neutron Cross Sections with the Oak Ridge Linear Accelerator Neutron Facility. Progress Report, April 1, 1979-March 31, 1980.
J. B. Garg. Nov 79, 10p
Contract EY-76-S-02-2439

This work involved the measurement, analysis, and interpretation of high-resolution neutron total and capture cross sections of many nuclei in the neutron energy range of few eV to few hundred keV. After a general overview of the program, the various experiments involved are described individually. These descriptions are of abstract length, and contain few data. (ERA citation 05:021426)

COO-2894-4 PC **A04**/MF **A01**
Lehigh Univ., Bethlehem, PA. Dept. of Physics.
Study of Multiparticle Jet Production Using Calorimeters, High-Energy Channeling, and Other High Energy Physics Research. Progress Report.
A. Kanofsky. 5 Dec 79, 64p
Contract EY-76-S-02-2894

Research progress in high-energy physics during the past year is summarized. Results of studies on high-energy jets, particle-nuclei interactions, and channeling have been reported. Other related work was also carried out. 38 figures, 8 tables. (ERA citation 05:023208)

COO-3064-041 PC **A02**/MF **A01**
Brookhaven National Lab., Upton, NY.
Search for Prompt Neutrinos and New Penetrating Particles from 28 GeV Proton-Nucleus Collisions.
A. Soukas, P. Wanderer, and W. Weng. 1979, 13p
Contract EY-76-C-02-3064

A search for weak or semi-strongly interacting particles produced in the collision of 4.9 x 10 exp 18 28-GeV protons with a thick copper and brass beam stop is described. 104 events were observed. Their characteristics are similar to those produced by neutrinos arising from proton interactions in a 15-cm-thick brass target. However, compared to the number expected, an excess of 48 events is found with uncertainities of +-10 (statistical) and +-12 (systematic). At most 6 events (68% C.L.) are attributable to beam losses. (ERA citation 05:021399)

COO-3246-19 PC **A05**/MF **A01**
Carnegie-Mellon Univ., Pittsburgh, PA. Dept. of Chemistry.
Nuclear Research with Heavy Ions. Annual Progress Report, January 1, 1979-December 31, 1979.
M. Kaplan. Oct 79, 79p
Contract EY-76-S-02-3246

The experimental research emphasizes the detection and measurement of light charged particles emitted in reactions between heavy ions and complex nuclei. The program involves a collaboration between Carnegie-Mellon University and SUNY at Stony Brook, and utilizes the SuperHILAC and 88" cyclotron accelerator facilities of the Lawrence Berkeley Laboratory. Correlations between light charged particles and heavy fragments provide detailed insights into the dynamics of the reaction mechanism. The light charged particles evaporated from fully accelerated fragments yield information on the excitation energies and spins of the equilibrated reaction products, whereas those particles that are emitted prior to thermal equilibration give a view of the early stages of the reaction. Experimental results of fusion and charged particle emission cross sections are discussed for a variety of heavy ion reactions, particularly those induced by exp 40 Ar ions. The theoretical development of the statistical model as applied to particle evaporation is reviewed, and semiempirical methods for facilitating comparisons with experimental data are presented. Current results from singles and coincidence experiments are given in detail for reactions of 340-MeV exp 40 Ar with Au, and analyses of average spins and energy sharing among particles are discussed. (ERA citation 05:021415)

CTA-EAV-05/78 PC **A02**/MF **A01**
Centro Tecnico Aeroespacial, Sao Jose dos Campos (Brazil). Inst. de Atividades Espaciais.
Compilation of Nuclear Parameters of Uranium, Thorium and Plutonium Isotopes.
H. Dias. Sep 78, 14p
In Portuguese.
U.S. Sales Only.

Recommended values of nuclear properties of thorium, uranium and plutonium isotopes are presented. A compilation of the available experimental data on the neutron (thermal and fast) induced reaction cross section is also presented. Expressions for calculations of the nu values as a function of the neutron energy are also given. (Atomindex citation 11:495982)

DESY-79/32 PC **A02**/MF **A01**
Deutsches Elektronen-Synchrotron, Hamburg (Germany, F.R.).
Two-Particle Correlations in E exp + E exp - Jets from QCD.
G. Schierholz, and J. Willrodt. Jun 79, 23p
U.S. Sales Only.

Two-particle correlation functions are introduced which vanish in the naive quark-parton model (zeroth order QCD) and directly measure higher order QCD corrections, i.e., three- (or more) jet final states. They have the advantage over a multijet analysis in spherocity, thrust and acoplanarity (i) to be insensitive to heavy quark-antiquark pair production and (ii) to be easy to measure. Detailed predictions for two-particle correlations are presented. (Atomindex citation 11:495871)

DESY-79/34 MF **A01**
Deutsches Elektronen-Synchrotron, Hamburg (Germany, F.R.).
Production of Three Large p, Jets in Hadron. Hadron Collisions.
Z. Kunszt, and E. Pietarinen. Jun 79, 58p
U.S. Sales Only. Microfiche copies only.

We discuss physical effects given by QCD 2 implies 3 scattering subprocesses. Transverse thrust distributions, jet and Pl exp 0 -Pl exp 0 azimuthal correlation, Psub(out) distributions have been calculated at different energies with various cut-off and are compared with the available data. Effects of transverse momentum smearing and jet broadening are also estimated. It is pointed out, that if the QCD description is correct, 3 jet effects will be revealed at transverse energies above E, approx. 20 GeV and transverse jet momenta above p, jet approx. 5 GeV in future ISR, SPS p anti p collider and ISABELLE experiments. (Atomindex citation 11:495839)

DESY-79/35 PC **A02**/MF **A01**
Deutsches Elektronen-Synchrotron, Hamburg (Germany, F.R.).
Comment on the ISR Pi exp 0 -Pi exp 0 Azimuthal Correlation Data.
J. F. Gunion, Z. Kunszt, and E. Pietarinen. Jun 79, 11p
U.S. Sales Only.

The Pl exp 0 -Pl exp 0 azimuthal angle distributions measured at ISR are described in terms of standard large p, 2 jet and 3 jet contributions in combination with a background obtained by superimposing two uncorrelated Pl exp 0 spectra (one at high p, the other at low p,). The main characteristics of the data can be fitted suprisingly well by a simple analytic expression. We emphasize the importance of having azimuthal angle correlation data at higher values of the transverse momentum cut. (Atomindex citation 11:495814)

DOE/ER/00946-3 PC **A02**/MF **A01**
Georgia Univ., Athens. Dept. of Physics.

High Energy Hadron-Hadron Collisions. Annual Progress Report for 1979.
T. T. Chou. Mar 80, 15p
Contract EY-76-S-09-0946

Work on high-energy hadron-hadron collisions in the geometrical model, performed under the DOE Contract No. DE-AS09-76ER00946, is summarized. Specific items studied include the elastic hadron-hadron scattering at ultrahigh energies and the existence of many dips, the computation of meson radii, the hadronic matter current effects on inelastic two-body processes, and the diffraction dissociation processes in hadron-nucleus and hadron-hadron collisions. No data are included with this report; references are given. (ERA citation 05:021407)

DOE/ER/00946-4 PC **A04**/MF **A01**
Georgia Univ., Athens.
Study of Matter Current Effects in Two-Body Inelastic Collisions.
M. K. Rulison. 1979, 70p
Contract AS09-76-ER00946
Thesis.

At the present time no comprehensive model of high energy hadronic scattering exists. Most of the existing models have a very restricted range of application. The geometrical model of hadronic scattering proposed by Chou and Yang has had great success in predicting high energy scattering phenomena. For example, the dip in pp elastic scattering, and pion and kaon radii were quite accurately predicted by the model. Use of pp differential cross section data also yields an excellent fit of the measured proton form factor in this model. The possible existence of hadronic matter current inside a polarized hadron and an experimental test of this idea were discussed by Chou and Yang in 1973. Subsequently the geometrical model was generalized to include the matter current effect by the same authors in 1976. The proposed experimental test of the matter current idea consists of determining the spin-rotation parameter, R, in polarized elastic meson-proton scatterings. The measurement of R usually requires a second scattering of the recoil proton off a known analyzer such as exp 12 C. The purpose of this work is to offer another method by which the hadronic matter current effect can be detected. Instead of elastic scattering the two-body inelastic scattering process pi exp - p implies K exp 0 lambda in which the final state hyperon is unstable against weak decay is considered. By observing the angular distribution of the decay products the rotation parameter, R, may be inferred. (ERA citation 05:023233)

DOE/ER/10423-T1 PC **A04**/MF **A01**
Minnesota Univ., Minneapolis.
Nuclear Structure Studies with Pions and Heavy Ions. Progress Report, June 1, 1979-May 31, 1980.
D. Dehnhard. Mar 80, 54p
Contract AC02-79ER10423

The elastic and inelastic scattering of pi exp + and pi exp - by exp 13 C, exp 16 O, and exp 17 O was studied at pion energies close to the (3,3) resonance. Data were taken at the Los Alamos Meson Physics Facility. Large asymmetries were observed, two of which are consistent with pure neutron and pure proton excitations. Transitions to strongly excited states of exp 13 C are in strikingly good agreement with theoretical predictions of Lee and Kurath. In sharp contrast, strong disagreements are found for the weakly excited states. The asymmetries for exp 16 O + pi exp +- were interpreted as due to isospin mixing between the excited states. High-resolution data for (t,t') and (exp 3 He, exp 3 He') on exp 13 C were taken to supplement the pion work. Asymmetries were found for the relative cross sections for some states. In studies of the heavy-ion-nucleus potential the effect of potential resonances on the elastic scattering of exp 16 O + exp 28 Si was found to be small. A close similarity between the elastic exchange amplitude at 180 exp 0 and the effect of the parity dependence on the elastic amplitude was found. Fits to the new data at 40 and 41.226 MeV required the use of a composite absorptive potential. The surface derivative part of this potential can be deduced from a coupled-channels calculation. 17 figures. (ERA citation 05:021420)

EFI-331(56)-78 PC **A02**/MF **A01**
Erevanskii Fizicheskii Inst. (USSR).
Intensity of Medium Electron Radiation as a Function of the Charge Lorentz Factor and the Parameters of a Stack of Thin Plates.
A. L. Avakyan, and C. Yang. 1978, 6p
In Russian.
U.S. Sales Only.

Analyzed is the frequency-angular distribution of radiation out from a stack of thin plates in uniform and straight-line passage of a fast charged particle through them. Studied is the dependence of the full intensity radiation on the stack parameters and the Lorentz factor of the charge. (Atomindex citation 11:495336)

EFI-350(8)-79 PC **A02**/MF **A01**
Erevanskii Fizicheskii Inst. (USSR).
Toward the Ground State in the Yang Mills Theory.
G. K. Savvidy. 1979, 12p
U.S. Sales Only.

Investigated is the excitation spectrum in the Yang Mills field with the constant coefficients B, C and D. It is shown, that unstable modes exist in this field and, consequently, the effective action GITA(A) has an imaginary part. Solution of the equation GITA'(A)=0 in the class of these fields, as it was in the case of a covariant constant field (directed along one of the axises of isotopic space) can not be stable. The expression for class of fields, containing the ground state is presented. (Atomindex citation 11:495405)

HU-P-D-13 PC **A03**/MF **A01**
Helsinki Univ. (Finland).
Studies on Inclusive Meson Resonance and Particle Production.
H. Saarikko. 1978, 30p
Thesis.
U.S. Sales Only.

Production and decay of meson resonances are studied in medium energy meson-proton collisions. Strong evidence is found that hadronic collisions are dominated by resonance production. Especially the vector mesons have often large inclusive cross sections, typically of the order of few millibarns at the present energies. In all, a majority of pions and kaons appear to be decay products of resonances or other unstable particles. The detailed kinematics of the parent resonance's decays is found to play an important role in determining inclusive pion spectra. The squared transverse momentum distributions of hadrons heavier than the pion appear to have in common an exponential behaviour, with a universal slope for the exponential fall-off. The observed vector meson yields suggest that only a small fraction of the direct lepton production observed at large transverse momentum in nucleon-nucleon interactions is accounted for by the "old" vector mesons. An attempt has been made to separate out the central production and fragmentation components of the meson production. Both the central production and the fragmentation of the incoming meson are found to be important mechanisms in the non-strange meson production whereas the central production of strange meson resonances is rare at our energies. The ratios of the observed meson yields are found to be generally in good agreement with a simple quark-counting model. (Atomindex citation 11:495936)

HU-P-156 PC **A04**/MF **A01**
Helsinki Univ. (Finland). Dept. of High Energy Physics.
Study of the Inclusive Reactions pi exp + p Implies rho exp 0 +X and pi exp + p Implies F+X at 8 GeV/C.
H. Saarikko. 13 Jun 78, 56p
U.S. Sales Only.

An analysis is presented on the production and decay of rho exp 0 (770) and f(1270) in pi exp + p interactions at 8 GeV/c. Differential cross sections and density matrix elements are given and compared with previous data. In the rho exp 0 production, both central production and fragmentation of the beam pi exp + are important mechanisms, whereas the f mesons are found to be produced dominantly through beam fragmentation at 8 GeV/c. A comparison with data on the reaction K exp - p implies antiKsup(*) exp 0 (890)+X reveals an interesting similarity to the reaction pi exp + p implies rho exp 0 +X, when studied in terms of the density matrix elements of the antiKsup(*) exp 0 and rho exp 0 . In the Regge-exchange region (small alpha t alpha and low missing mass) pseudoscalar exchange dominates both in pi exp + p implies rho exp 0 +X and pi exp + p implies f+X. A single term triple-Regge formula gives a good parametrisation of the pseudoscalar exchange part in the reaction pi exp + p implies rho exp 0 +X. (Atomindex citation 11:495935)

HU-TFT-79-18 PC **A03**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Isobar Model for the Pd Implies T pi exp + Reaction.
A. M. Green, and M. E. Sainio. 1979, 34p
U.S. Sales Only.

The differential cross section for the pd implies t pi exp + reaction is calculated at the three proton laboratory energies 400, 470 and 600 MeV. The triton wavefunction is taken to be of correlated Gaussian form, and the deuteron is one of the s-wave forms due to Hulthen, McGee and Paris. The pion production is considered to take place from intermediate states based on the five types of two-body correlations N delta (exp 5 S sub 2 , exp 5 D sub 2 , exp 5 D sub 0) and NN(exp 1 D sub 2 , exp 1 S sub 0). The final cross sections are not in good agreement with experiment. (Atomindex citation 11:495812)

HU-TFT-79-21 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Estimate of the Bag Constant.
C. G. Kaellman. Jun 79, 11p
U.S. Sales Only.

The bag constant is estimated using the dilute gas approximation for instantons. For Bsup(1/4) we find a value almost twice the MIT value, corresponding to rather small size of hadrons. The estimate is also compared to other theoretical estimates. (Atomindex citation 11:495828)

HU-TFT-79-25 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Gluon Jet Pair Production in E exp + E exp - Initiated Photon-Photon Collisions.
K. Kajantie, and R. Raitio. 1979, 11p
U.S. Sales Only.

Cross sections for e exp + e exp - implies e exp + e exp - + 2 gluon jets are calculated in order to study the role of gluons in QCD. The subprocesses included are qantiq implies gg, gg implies gg and the box diagram gamma gamma implies gg via an intermediate virtual quark loop. Our analysis indicates that the gluon box diagram dominates over the gluon tree diagrams at large transverse momenta, xsub(T) = 2qsub(T) sqrt s > or approximately 0.15. The box diagram cross section is at all xsub(T) values about 1/5 of the quark jet pair contribution gamma gamma implies qantiq. (Atomindex citation 11:495830)

HU-TFT-79-26 PC **A02**/MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Gauge-Invariant Formulation of Gauge Theories.
C. Cronstroem. 1979, 11p
U.S. Sales Only.

A general method for constructing gauge-invariant variables in theories of the Yang-Mills-type is given. In a particular case this method gives rise to a new gauge-condition, which generalizes the Lorentz-condition. (Atomindex citation 11:495348)

HU-TFT-79-28 MF **A01**
Helsinki Univ. (Finland). Research Inst. for Theoretical Physics.
Imaginary Part of the Anti NN Potential.
A. M. Green, M. E. Sainio, and S. Wycech. 1979, 12p
U.S. Sales Only. Microfiche copies only.

It is shown that presence of bound anti NN states leads to a long range imaginary component of the anti NN potential. This potential is also very energy

dependent, becoming weaker at lower energies. (Atomindex citation 11:495997)

IAE-3067 MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Atomnoi Energii.
Macroscopic Nuclear Characteristics and Their Fluctuations.
A. P. Platonov, E. E. Sapershtein, and V. A. Khodel. 1978, 32p
In Russian.
U.S. Sales Only. Microfiche copies only.

The calculation method of macroscopic nuclear characteristics is described. In contrast to the Hartree-Fock variation method it is based on utilization of strict conditions of matching which is a consequence of spontaneous violation of translation invariance and it correctly regards for the effects caused by nonidentity of quasi-particles and particles, i.e. by differing from 1 of the alpha renormalization factor characterizing the quasi-particle weight in a single-particle state near the Fermi surface. The method permits to calculate the equilibrium density and the E sub 0 binding energy of the nucleus on the basis of the quasi-particle picture: the energy of a Fermi liquid drop is equal to the energy of the gas of interacting quasi-particles experienced only binary collisions. In a limiting case, when alpha is equal to 1, the calculation formulae of the given method acquire the Hartree-Fock form. The contribution of virtual collective excitation to the nucleus density distribution which is completely neglected in the Hartree-Fock calculations is analyzed. It is found that it is responsible to a considerable extent for fluctuations of the mean square nuclei radii. (Atomindex citation 11:496029)

IC-78-27 PC **A02**/MF **A01**
International Centre for Theoretical Physics, Trieste (Italy).
Sensitivity of the Three-Body Calculations to Different Effects.
A. Osman. Apr 78, 14p
U.S. Sales Only.

The bound state of few-body systems in light nuclei is studied as a three-body problem. The three-body problem is solved following the different approaches of the Faddeev formalism as well as the unitary pole approximation. Separable approximations are introduced to reduce the three-body problem to a set of coupled integral equations. Numerical calculations are carried out for the resulting integral equations and the separable expansion. In the present work, we calculate the ground-state binding energy of the bound three-nucleon system exp 3 H. The main interest of the present work is to investigate the sensitivity of the three-body binding energy to different effects in the problem. For this reason, we study the dependence of the three-body binding energy on different forms of local and separable two-body potentials, the effective range of the two-body potentials and on the percent of the D state in the deuteron wave function. Also, we test the sensitivity of the three-body binding energy to the considered number of terms from the separable expansion. (Atomindex citation 11:495394)

IFVE-OEF-78-133 PC **A03**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Study on the pi exp - p Interactions with Neutral Final States.
F. Binon, K. Brikman, and Yu. B. Bushnin. 1978, 50p
In Russian.
U.S. Sales Only.

Reactions with the neutral final state of the pi exp - + p implies M exp 0 + n type where M sub 0 are pi exp 0 , eta, h(2020), A sub 2 , phi neutral meson particles are investigated. A program of experiments in pion beam with momenta up to 300 GeV/c is described. Tehe program includes the study of production of heavy particles with new hidden quantum numbers, search for particles with high spins and masses, investigation of binary reactions at large momentum transfer. To detect multiphoton final states use is made of 4000-cell Cherenkov hodoscope spectrometer GAMS. The spectrometer measures the vector of a particle momentum and that gives useful physical information during inline processing. (Atomindex citation 11:495900)

IFVE-OEF-78-80 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Forward pi exp - p Elastic Scattering at 40 GeV/c.
V. D. Apokin, Yu. A. Matulenko, and S. V. Nurushev. 1978, 12p
U.S. Sales Only.

The real to imaginary part ratio of the forward pi exp - p elastic scattering amplitudes at 40 GeV/c has been measured using a recoil detector combined with a multiwire proportional spectrometer. The recoil detector was an ionization chamber filled with hydrogen which served both as a gas target and as a detector of recoil protons. The detector measured the recoil energy, the recoil polar angle and the reaction vertex position inside the operating chamber volume. The energy resolution in the Coulomb nuclear interference region was equal to 60 KeV. The spectrometer measured the scattering angle and the momentum of the forward particle. The experimental value of the real to imaginary part ratio of the forward pi exp - p elastic scattering amplitude at 40 GeV/c rho=-0.037+-0.017 agrees well with the results of the dispersion relation calculations. (Atomindex citation 11:495889)

IFVE-OEIPK-78-59 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Associated Charge Multiplicity in K exp - p Interactions at 32 GeV/c.
V. V. Babintsev, M. Val'ter, and U. Gench. 1978, 17p
In Russian.
U.S. Sales Only.

Experimental data are presented for the average charge multiplicity associated with the production of pi exp + , pi exp - , Ksub(s)sup(0), lambda exp 0 and p in 32 GeV/c K exp - p interactions. The average associated charge multiplicity is found to depend on the particle considered to be an increasing function of the square of the associated system mass and of its momentum transfer. They are compared with the results for the total charged particle multiplicity distributions. (Atomindex citation 11:495894)

IFVE-OEIPK-78-71 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Study on the Correlations Between Transverse Momenta of Two Pions in K exp - p Interactions at 32 GeV/c.
V. V. Babintsev, E. V. Vlasov, and G. V. Zholobov. 1978, 19p
In Russian.
U.S. Sales Only.

Features of correlations between transverse momenta of two particles in inclusive and semi-inclusive K exp - p-interactions at 32 GeV/c are studied in terms of correlation functions and asymmetry parameters. Studies were carried out on Serpukhov synchrotron in the K exp - -meson separated beam. About 46000 events in the Mirabel bubble chamber were measured. It was found, that between vectors of transverse momenta of unlike charged pions, kinematical correlations dominate in Psub(T1,2) implies =0.1 GeV/c region, while in the system of like-like charged pions there are positive correlations of interference type. (Atomindex citation 11:495893)

IFVE-OTF-78-66 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Properties of Charmed Particle Nonleptonic Interactions Following from delta T=1/2 Rule for Usual Mesons and Baryons.
B. A. Arbuzov, V. G. Cartasheva, and F. F. Tikhonin. 1978, 15p
U.S. Sales Only.

A version of weak interaction has been considered in the frame of the model of 4-colour quarks with integer charges. The white part of the nonleptonic Lagrangian, responsible for the weak decay of usual particles, is constructed in such a way, that the delta T=1/2 rule be fulfilled. This requirement fixed in a certain way the set of the parameters of full weak hadronic current. Parameters obtained in such a way give a complete description of the part of the Lagrangian with c-quark. The properties of the latter one reproduce to a certain extent those of the Lagrangian obtained in the GIM model, however the Lagrangian obtained in this work contains additional terms, that cannot be derived in the GIM model. (Atomindex citation 11:495762)

IFVE-OTF-79-59 PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov. Inst. Fiziki Vysokikh Energii.
Two-Dimensional Gauge Fields with Independent Values of the Stress Tensor at Each Point.
1979, 24p
In Russian.
U.S. Sales Only.

Quantum measure is constructed for the two-dimensional Euclidean gauge field with lagrangian 1/4qsup(2)(Fsub(lambda mu), Fsub(lambda mu)), the gauge group being an arbitrary compact Lie group. The measure is expressed in terms of the contour variables. The corresponding stress tensor Fsub(lambda mu)(x) is a gaussian generalized random field with independent values at each point. Some generalizations towards non-gaussian stress tensors are incidentally included. (Atomindex citation 11:495392)

INIS-mf-4723 MF **A01**
Bergen Univ. (Norway). Eysisk Inst.
Study of the Role and Characteristics of Multiple-Step Transfer Mechanisms in Quasi-Elastic Heavy-Ion Collisions, with Emphasis on Nuclear Spectroscopy.
J. S. Vaagen. 1976, 124p
Thesis.
U.S. Sales Only. Microfiche copies only.

Attention is primarily focused on the possible usefulness of heavy-ion-induced two-nucleon transfer reactions as a spectroscopic tool, in particular, on how nuclear structure, as reflected in transfer form factors, can be probed through shape characteristics of angular distributions. Studies of this type have been gaining increasing interest due to new developments of experimental detection techniques and equipment. This has made measurements of small cross sections (down to I mu b) more feasible, and high resolution (40-70 keV) is obtainable with heavy-ion (carbon and oxygen) beams, as was proven by experimental collaborators during the development of the projects on which this thesis is based. The thesis is composed of a selection of publications writting during the period 1973-1976, preceded by an introduction in which the motivation for and the content of the papers in Parts B and C is outlined in condensed form. (Atomindex citation 11:498720)

INIS-mf-5374 PC **A05**/MF **A01**
Technische Univ., Munich (Germany, F.R.). Fachbereich Physik.
Gamma -Spectroscopic Investigations of High Spin States in Heavy Ion Compound Reactions and Multiple Coulomb Excitation.
F. V. Feilitzsch. 22 Dec 77, 83p
In German.Thesis.
U.S. Sales Only.

exp 174 Hf and exp 173 Hf were investigated by gamma spectroscopy via the exp 160 Gd(exp 18 O, xn) reaction. (Atomindex citation 11:498783)

INIS-mf-5378 PC **A05**/MF **A01**
Cologne Univ. (Germany, F.R.). Mathematisch-Naturwissenschaftliche Fakultaet.
Investigation of the Wave Functions of Low-Lying States in exp 208 Pb by the Elastic and Inelastic Scattering of Polarized Protons from exp 207 Pb.
G. Latzel. 8 Jul 78, 92p
In German.Thesis.
U.S. Sales Only.

The excitation functions of the differential cross section and the analyzing power of the scattering

exp 207 Pb(p-bar, p') were measured in an energy range from 13.5 to 18 MeV at THETAlab = 140 exp 0 and 160 exp 0 . By analyzing the elastic scattering 38 isobaric analog resonances (IAR) in exp 208 Bi appearing in this range were identified and their spins, determined. The partly hypothetical spin relations from the literature for the states in the parent nucleus exp 208 Pb had to be corrected in many cases. (Atomindex citation 11:498820)

INIS-mf-5382 MF **A01**
Kaiserslautern Univ. (Germany, F.R.).
Determination of Lowest T-Channel Partial Waves and Scattering Length of Their Phase in Pion-Nucleon Scattering.
R. Mueller. 14 Feb 79, 178p
In German.Thesis.
U.S. Sales Only. Microfiche copies only.

The author describes the analytical continuation of the amplitudes for pion-nucleon scattering from the physical s-channel region into the non-physical t region in a model-independent way, by use of interior dispersion relations. The pi pi scattering lengths are also determined. (Atomindex citation 11:498539)

INIS-mf-5384 PC **A03**/MF **A01**
Technische Univ., Munich (Germany, F.R.). Fachbereich Physik.
Study of Charged-Particle Correlation in Proton-Proton Interactions at High Energies.
S. Uhlig. 26 Jun 78, 45p
In German.Thesis.
U.S. Sales Only.

Measurement of charged-particle correlations in proton-proton interactions in ISR-storage rings are reported. (Atomindex citation 11:498618)

IPNO-TH-78-12 PC **A05**/MF **A01**
Paris-11 Univ., Orsay (France). Inst. de Physique Nucleaire.
Effects of Particle-Collective State Coupling on the Hartree-Fock Potential in exp 208 Pb.
V. Bernard. 1978, 92p
In French.Thesis.
U.S. Sales Only.

The nucleon-nucleus optical potential is studied by starting from the Hartree-Fock potential and calculating the effects of the coupling of the particle to the collective states of the nucleus. The basic ingredient to derive the basis of Hartree-Fock states, the collective states (described in a self consistent RPA framework) as well as the residual particle-hole interaction is the effective Skyrme force. One thus obtains a complex and non local corrective potential whose absorptive part was more particularly studied in the case of exp 208 Pb and for incident neutron enegies up to 30MeV. In the case of the interaction SIII one used, this absorptive part is surface peaked, due to the particular density dependence of the coupling interaction. It has a correct energy dependence but the strengh is too weak as compared to the phenomenological potentials. This might be due in part to the fact that rearrangement channels, which not contained in these calculations, could be important. (Atomindex citation 11:495963)

IPNO-TH-78-49 PC **A02**/MF **A01**
Paris-11 Univ., Orsay (France). Inst. de Physique Nucleaire.
Gauge Theory in Terms of Projector Valued Fields.
M. Dubois-Violette, and Y. Georgelin. Dec 78, 11p LPTHE-78-34
U.S. Sales Only.

A formulation of gauge theory involving only globally defined gauge invariant fields is given by using universal connections. (Atomindex citation 11:495796)

ISN-78-08 MF **A01**
Grenoble-1 Univ. (France). Inst. des Sciences Nucleaires.
Muon Capture by Tritium.
J. Torre. 1978, 90p
In French.Thesis.
U.S. Sales Only. Microfiche copies only.

The muon capture rate is computed with realistic wave function for the initial tritium nuclei (Faddeev equations on configuration space with realistic potentials), and plane wave approximation for the final three neutrons, with the effective Hamiltonian of Fujii and Primakoff for muon capture and via a non energy weighted sum rule. Such a forbidden transition is hoped to be a probe for exchange current contributions. (Atomindex citation 11:495876)

ITEF-10(1979) PC **A02**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Taking Account of Multiple Nuclear Rescattering with Small Transferred Momenta on the Transmission of Hadrons Through Matter.
M. V. Kosov. 1979, 7p
In Russian.
U.S. Sales Only.

A general analytical method for calculating the coherent nuclear and quasielastic rescatterings of hadrons in a substance is considered. Also considered in detail are corrections for rescatterings, which are necessary to introduce in measuring a differential elastic cross section of hadron-nucleus interaction and in measuring a total inelastic cross section in the framework of the transmission method. (Atomindex citation 11:496011)

ITEP-86(1978) PC **A03**/MF **A01**
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Teoreticheskoi i Eksperimental'noi Fiziki.
Dynamics of Heavy Quarks in Nonperturbative QCD Vacuum.
M. B. Voloshin. 1978, 29p
U.S. Sales Only.

Nonperturbative large scale fluctuation of gluonic field which are present in the exact vacuum of QCD result in modification of interaction between quarks in quarkonium. Such effects are considered for heavy quarks in cases when the size of the quarkonium system is much smaller than that of the dominating gluonic fluctuations. The Green function of relative motion in heavy quarkonium is calculated for energy below threshold with the account of leading nonperturbative effects. It is shown that once nonperturbative gluonic degrees of freedom are taken into consideration they can never be absorbed into a sort of interaction potential between quarks. (Atomindex citation 11:495878)

JINR-E-1-12087 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Energy Spectra of Protons Emitted in Pion-Xenon Nuclei Collision Events Without Multiparticle Production.
Z. Strugalski, T. Pawlak, W. Peryt, and J. Pluta. 1979, 12p
U.S. Sales Only.

Energy spectra of protons emitted in pion-xenon nuclei collisions without multiparticle production have been measured and are analyzed. The pictures used in this analysis were taken in the 180 litre xenon bubble chamber exposed to the negative pion beam of 3.5 GeV/c momentum. The proton spectra in the pion-xenon collision events with one secondary charged pion, without secondary pions, with one secondary neutral pion, with one secondary pion emitted at different angles and with protons emitted forward and backward are presented. Irregularities are observed in the proton spectra which appear as wide peaks mainly at energies near 40, 140 and 220 MeV. They may occur as a result of some systems of nucleons. (Atomindex citation 11:496171)

JINR-E-2-11932 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Large Psub(Tr) and Quark-Quark Cross Section in the Dynamical Model of Factorizing Quarks.
V. N. Kapshay, A. V. Sidorov, and N. B. Skachkov. 1978, 7p
U.S. Sales Only.

Dynamical model of factorizing quarks containing the quark mass as free model parameter was described. Model calculations were compared with the experimental data on the cross section of the inclusive pi sup(o) meson production in the proton-proton interaction. It is shown that the results of the paper are in good agreement with experiments. (Atomindex citation 11:495833)

JINR-R-1-11820 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.
Inclusive Distributions of Charged Particles in the pi exp - C Interactions at 5 GeV/C.
O. B. Abdinov, A. A. Bairamov, Yu. A Budagov, Sh. Valkar, and V. B. Vinogradov. 1978, 14p
In Russian.
U.S. Sales Only.

The experimental data of the investigation of inclusive characteristics of pi exp +- -mesons and protons, produced in the interaction between pi exp - - mesons with the nitrogen nuclei at 5 GeV/C are presented. The work is carried out on the basis of photoes processing from a meter propane bubble chamber of ZNP, JINR. The experimental data are compared with the results of the calculation on the cascade evaporation model. It is shown that the model of the internuclear cascade satisfactorily describes the inclusive experimental characteristics. A good agreement of the calculated and experimental data is observed for pi exp - -mesons. Some discrepancies in the spectra of positive particles can be explained by the complication of pi exp + -meson and proton separation. Protons constitute the main part in the positive particle spectra with P>=1 GeV/c. (Atomindex citation 11:496054)

JINR-R-2-12263 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Pion and Proton Electromagnetic Form Factors at Large alpha Q exp 2 alpha.
S. Dubnichka, and V. A. Meshcheryakov. 1979, 12p
In Russian.
U.S. Sales Only.

A method is proposed for describing the hadron electromagnetic form factors at large momentum transfer alpha Q exp 2 alpha both in time- and space-like regions. The method is based on the hypothesis on the structure of the Riemannian surface. It takes into account that the surface is multisheeted at large alpha Q exp 2 alpha and there exist two-particle branch points. The form factors are represented by the Dirichlet series in the uniformizing variable. Formulae obtained show clearly the connection between the asymptotic behaviour in the space-like region, phase and modulus of the form factor and corresponding alpha Q exp 2 alpha in the time-like region. For the pion electromagnetic form factor the hypothesis is statistically justified. Predictions are made for the behaviour of the proton form factor in the time-like region. (Atomindex citation 11:495795)

JINR-1-11540 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.
Investigation of Correlations Between pi exp +- Mesons in the pi exp - p Interactions with Production of Particles with Large Transverse Momenta.
V. N. Penev, and A. I. Shklovskaya. 1978, 16p
In Russian.
U.S. Sales Only.

Investigation of the pi exp - p interactions at 40 GeV/c accompanying a particle with the transverse momentum more than 0.8 GeV/c is carried out. Azimuthal asymmetry of the pi exp +- mesons and charge correlations between them are considered. The experiments were accomplished by means of the two-meter propane bubble chamber of the JINR. In the case of events with two pi exp +- mesons with psub(T)>0.8 GeV/c, in the distributions of rapidity at Y sub 1 =Y sub 2 , maxima are observed, which may be interpreted as short-range correlations between particles with high transverse momentum. (Atomindex citation 11:495930)

JINR-1-12046 PC **A02**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy.

Investigation of Vector Form Factor in Ksub(E3)Sup(0) Decays.
V. K. Birulev, G. Vestergombi, and T. V. Gvakhariya. 1978, 6p
In Russian.
U.S. Sales Only.

Analyzed are about 2600 events of the Ksub(l) implies pi sup(+-) + esup(+-) + nu sub(e) (Ksub(e3)sup(0)) decays registered with a filmless spark spectrometer at the Serpukhov accelerator. A dependence of the vector form factor on the 4-momentum squared transferred to a lepton pair in the range from 0 to 0.10 GeV/c exp 2 is obtained. The dependence is shown to be linear in this range. The value of lambdasub(+)= 0.0286+-0.049 was obtained for the parameter of formfactor inclination. (Atomindex citation 11:495901)

KIYI-78-11 PC **A03**/MF **A01**
Akademiya Nauk URSR, Kiev. Inst. Yadernykh Issledovanii.
Evaluated Neutron Cross Sections and Resonance Integrals of the Fission Products with Z=44-50.
A. F. Fedorova, and Zh. I. Pisanko. 1978, 42p
In Russian.
U.S. Sales Only.

Estimated are the neutron cross sections and resonance integrals for fission products (isotopes of Ru, Rh, Pd, Ag, Cd, In, Su elements with Z=44-50). Calculated are the contribution of positive resonances to the cross sections at the V=220 m/s neutron velocity. Presented are the recommended neutron cross sections at a given neutron velocity. (Atomindex citation 11:495989)

LBL-10428 PC **A03**/MF **A01**
California Univ., Berkeley. Lawrence Berkeley Lab.
Results on Charmed Baryons and Mesons from the SLAC-LBL Mark II Detector at SPEAR.
G. Goldhaber. 1979, 30p CONF-7910103-5
Contract W-7405-ENG-48
Workshop on the production of new particles in super high energy collisions, Madison, WI, USA, 22 Oct 1979.

Results from the SLAC-LBL Mark II detector at SPEAR are presented. A few of the very recent results are emphasized, namely: (1) The observation of charmed baryons; a signal lambda /sub c/ implies pK exp - pi exp + and the charge conjugate of that channel, anti lambda /sub c/ implies anti pK exp + pi exp - are now established. Some evidence also exists for other channels, K/sub S/p, lambda pi exp + , etc. (2) The study of charmed mesons. Here some new hadronic decay modes are mentioned, and the Cabibbo-suppressed decay modes. (3) The D exp + - D exp 0 lifetime ratio; evidence is presented that the D exp + has a longer lifetime than the D exp 0 by about a factor of three, although the statistical error is fairly large on this number. (ERA citation 05:021396)

LPC-78-02 MF **A01**
College de France, Paris. Lab. de Physique Corpusculaire.
Real Photon Spectral Weight Functions, Imaginary Part of Vacuum Polarization and Electromagnetic Vertices.
C. Chahine. Feb 78, 56p
U.S. Sales Only. Microfiche copies only.

The concept of a real photon spectral weight function for any cross-section involving charged particles is introduced as a simple approximation taking into account the soft part of photon emission to all orders in perturbation theory. The spectral weight function replaces the energy-momentum conservation delta function in the elastic cross-section. The spectral weight function is computed in closed form in space-time and in the peaking approximation in momentum space. The spectral weight function description is applied to the imaginary part of vacuum polarization ImPI and to electron-proton scattering. A spectral representation for ImPI is derived and its content compared with the known fourth order result, showing in particular the identity of the soft and peaking approximations in lowest order. The virtual photon radiative corrections are discussed in part, with emphasis on the threshold behavior of the vertex functions. A relativistic generalization of the electric non-relativistic vertex function is given, whose asymptotic behavior is appropriate to use in conjuction with the spectral weight function. (Atomindex citation 11:495780)

LPC-78-09 PC **A02**/MF **A01**
College de France, Paris. Lab. de Physique Corpusculaire.
New Data on Anti-Pp and K exp - p Two-Body Reactions around 90 exp 0 C.M Between 3 and 12GeV/C.
A. de Bellefon, F. Bourgeois, and J. Gago. 1978, 9p CONF-780826-43
19. conference on high energy physics, Tokyo, Japan, 23 Aug 1978.
U.S. Sales Only.

An experiment on two-body reactions around 90 exp 0 has been completed recently using the Omega Spectrometer at the CERN SPS and the new RF separated beam. At 12 GeV/c cross sections for anti-pp, K exp - p are similar to pi exp - p elastic scattering and 2 orders of magnitude smaller than pp elastic scattering. Two meson annihilation of anti-pp is still more than an order of magnitude lower than elastic scattering for/cosinus THETA center of mass/<.6. (Atomindex citation 11:495897)

LPNHEP-78-2 PC **A03**/MF **A01**
Paris-6 Univ. (France). Lab. de Physique Nucleaire et de Hautes Energies.
Lambda , sigma exp 0 and Y* Inclusive Reaction in K exp - p Interactions at 8.25GeV/C.
M. Baubillier, I. J. Bloodworth, and G. F. Bossen. 1978, 26p CONF-780826-41
19. conference on high energy physics, Tokyo, Japan, 23 Aug 1978.
U.S. Sales Only.

A study of inclusive lambda production in a bubble chamber K exp - p experiment at 8.25 GeV/c (present sentivity about 50 evts/ mu b) is reported. A comparison with sigma exp 0 and Y* inclusive production is made. The inclusive lambda production is studied in the framework of the triple-Regge model. (Atomindex citation 11:495895)

LPNHEP-78-3 PC **A02**/MF **A01**
Paris-6 Univ. (France). Lab. de Physique Nucleaire et de Hautes Energies.
Discussion About Baryonium.
C. de La Vaissiere. 1978, 10p CONF-7806132-5
European antiproton symposium, Barr, France, 25 Jun 1978.
U.S. Sales Only.

Colour-antisymmetric diquarks A behave in many respects like antiquarks. One may expect A anti-A systems to be narrow states mainly coupled to baryon-antibaryon pairs. But, because of composite nature of diquarks, pure A anti-A systems can be achieved in very restrictive situations which may explain the elusiveness of baryonium. (Atomindex citation 11:495841)

LPNHEP-78-4 PC **A02**/MF **A01**
Paris-6 Univ. (France). Lab. de Physique Nucleaire et de Hautes Energies.
XI Exp - Inclusive Production in K exp - p Interactions at 8.25GeV/C.
M. Baubillier, I. J. Bloodworth, and G. F. Bossen. 1978, 15p CONF-780826-42
19. conference on high energy physics, Tokyo, Japan, 23 Aug 1978.
U.S. Sales Only.

A study has been made of inclusive XI exp - production in a bubble chamber K exp - p experiment at 8.25 GeV/c. Present sensitivity is about 50 evts/ mu b. The cross section is given and its dependance on x and sub(T) sup(2) is studied. (Atomindex citation 11:495896)

LYCEN-7807 PC **A02**/MF **A01**
Lyon-1 Univ., Villeurbanne (France). Inst. de Physique Nucleaire.
Polarization Observables in pi -D Scattering.
N. Giraud, C. Fayard, G. H. Lamot, and Y. Avishai. Mar 78, 10p
U.S. Sales Only.

Exact calculations of vector and tensor polarizations are presented for the reaction pi +d implies pi +dsup(implies) at Tsub(pi) = 142 MeV. They are aimed at meeting the apparent demand raised by upcoming pertinent experiments. The effects of deuteron D state, participating pi -N partial waves and coupling of different pi -d orbital angular momenta are found to be very important. (Atomindex citation 11:495995)

LYCEN-7808 PC **A02**/MF **A01**
Lyon-1 Univ., Villeurbanne (France). Inst. de Physique Nucleaire.
Nuclear Critical Opalescence, a Precursor to Pion Condensation.
M. Ericson, and J. Delorme. Mar 78, 9p
U.S. Sales Only.

It is shown that pion condensation in nuclei, a long range phenomenon, has a precursor in the disordered phase, the local ordering of spins which becomes of infinite range at the critical point. A new physical effect arising from this short range order is predicted, namely the enhancement of the static nuclear pion field near the critical momentum. This phenomenon is strongly reminiscent of the critical opalescence observed in the scattering of neutrons by antiferromagnetic subtances. (Atomindex citation 11:495986)

LYCEN-7816 PC **A02**/MF **A01**
Lyon-1 Univ., Villeurbanne (France). Inst. de Physique Nucleaire.
Practical Scheme for Low Energy pi -D Scattering.
Y. Avishai, N. Giraud, C. Fayard, and G. H. Lamot. Apr 78, 12p
U.S. Sales Only.

The Pauli principle is applied to the Afnan-Thomas model and the pi -d scattering problem is solved at low energy using a modified version of the Amado-Lovelace equations, which includes the absorption channel and yet is free of overcounting. Numerical results are presented for asub(pi d) (in very good agreement with experiment) and for dsigma/d omega at Tsub(pi)=25MeV. Inelastic processes can be treated as well. (Atomindex citation 11:495958)

LYCEN-7843 PC **A03**/MF **A01**
Lyon-1 Univ., Villeurbanne (France). Inst. de Physique Nucleaire.
Irreducible Tensor Methods Made Easy Through the Investigation of More or Less Complicated Exercices.
M. Kibler. Jul 78, 47p
U.S. Sales Only.

Some peculiar aspects concerning Wigner-Racah algebra for a chain of finite and compact groups and symmetry adaptation in spectroscopy are investigated through a set of exercices. A first part is devoted to basic group theoretical relations (especially orthogonality and convolution relations), Clebsch-Gordan coefficients, isoscalar factors, recoupling coefficients, and Racah-Wigner unit tensors. The remaining part deals with applications to crystal-field theory and related phenomena. (Atomindex citation 11:495381)

PB80-194434 Not available NTIS
National Bureau of Standards, Washington, DC.
Glueballs: Their Spectra, Production and Decay.
Final rept.,
J. J. Coyne, P. M. Fishbane, and S. Meshkov. 7 Apr 80, 6p
Sponsored in part by National Science Foundation, Washington, DC.
Pub. in Jnl. of Physics Letter 91B n2 p259-264, 7 Apr 80.

A systematic enumeration of the glueball spectrum of QCD and other SU(n) gauge theories yields (J sup PC) = odd(-+), even(+-), and 0(--) states in addition to the usual quark model states. Production and decay mechanisms for these new states are discussed. The authors obtain a significant radiative decay width of the psi/J into a 0(-+) glueball via mixing with the (eta sub c).

PUC-tn-03/79 PC **A02**/MF **A01**
Pontificia Univ. Catolica do Rio de Janeiro (Brazil). Inst. de Fisica.
Behavior of the A sub 2 Trajectory in Reggeon Field Theory.
V. L. V. Baltar. Mar 79, 18p

U.S. Sales Only.

Comparing experimental data for the reaction pi exp - p implies eta n with results obtained in the context of Reggeon field theory, strong indications are found that, at high energies, the trajectories of the A sub 2 pole and all its associated branch points overlap. This explains why simple Regge pole models for processes mediated by the A sub 2 pole are in good agreement with experimental results, while in diffractive reactions all the branch points must be explicitly taken into account. (Atomindex citation 11:495763)

RRK-78-22 PC **A02**/MF **A01**
Hiroshima Univ., Takehara (Japan). Research Inst. for Theoretical Physics.
Possible Situation for Gauge Independence of Wave-Function Renormalization Constants in Gauge-Field Theories.
T. Fukuda, R. Kubo, and K. I. Yokoyama. Nov 78, 11p
U.S. Sales Only.

Possibility of gauge independence of wave-function renormalization constants is studied on the basis of gauge-field theories with gauge covariance. By use of the expression for the double-pole type propagator D tilde sub(f)(x), exploited by Zwanziger, it is asserted that D tilde sub(f)(0) can be consistently taken zero. As a consequence, all renormalization constants become gauge independent, contrary to the conventional understanding. (Atomindex citation 11:495363)

RRK-78-25 PC **A02**/MF **A01**
Hiroshima Univ., Takehara (Japan). Research Inst. for Theoretical Physics.
Higgs-Kibble Model on the Basis of a Canonical Yang-Mills Field Theory with Gauge Covariance, 2.
T. Fukuda, and K. I. Yokoyama. Nov 78, 11p
U.S. Sales Only.

On the basis of a canonical Yang-Mills field theory with gauge covariance, spontaneous breakdown in the SU(2) Higgs-Kibble model is treated in a way different from that presented in the first part of the same series. Renormalization scheme takes a somewhat different form, though there appear wave-function renormalization constants common to those defined in the first part. A dipole-ghost character of the Goldstone boson field in general gauges is revealed more naively. It is shown that a set of asymptotic fields does not alter at all. (Atomindex citation 11:495802)

RRK-79-3 PC **A02**/MF **A01**
Hiroshima Univ., Takehara (Japan). Research Inst. for Theoretical Physics.
Gauge Covariance Approach to Massive Yang-Mills Fields.
K. I. Yokoyama, M. Takeda, and M. Monda. Jan 79, 12p
U.S. Sales Only.

By observation of the gauge structure introduced in the SU(2) Higgs-Kibble model on the basis of a massless Yang-Mills field theory with gauge covariance, another possible formalism of a massive Yang-Mills field theory with gauge covariance is presented. The formalism exhibits a close analogy to the case of massive abelian-gauge fields. In contrast with the case of the Higgs-Kibble model, no dipole-ghost field is introduced in the formalism. Supplementary conditions for physical states are given in a consistent way. (Atomindex citation 11:495880)

RRK-79-6 PC **A02**/MF **A01**
Hiroshima Univ., Takehara (Japan). Research Inst. for Theoretical Physics.
Hadronic Decays of the psi and Deviation from the Exact SU(3) Symmetry of the IOZ Violating Strong Interaction.
M. Shintani, and K. Terasaki. Mar 79, 20p
U.S. Sales Only.

Based on the quark-parton model and the vector dominance, we shall phenomenologically deal with the two-body hadronic decays of the PSI particle. The IOZ violating strong decays of the PSI are assumed to be dominantly mediated by the gluons. We shall concentrate our attention on the question of to what extent the strong decay amplitudes violating the IOZ-rule are deviated from the exact SU(3). The contribution due to the electromagnetic interaction (the one-photon intermediate state) is also taken into account. Through the X exp 2 -fitting method, it is concluded that (i) the large deviation from the exact SU(3) in the IOZ violating strong decays of the PSI exists (beta asymptotically equals 0.4), (ii) the interference effect between the gluon-exchange and the one-photon exchange processes is small (delta asymptotically equals 80 exp 0), and (iii) the relative size of these two amplitudes is exp + G(u)/E(u) exp + asymptotically equals sqrt 10. (Atomindex citation 11:495872)

WIS-Ph-36/79 PC **A02**/MF **A01**
Weizmann Inst. of Science, Rehovoth (Israel).
Gauge-Symmetry Hierarchies Revisited.
E. Gildener. 1979, 12p
U.S. Sales Only.

It was shown by the author in a previous paper that in each order of perturbation theory there is an upper bound on the range of validity of a gauge hierarchy. Thus constructing a large hierarchy requires a fine-tuning of the scalar-field parameters. It was stated that the possibility of an inherent bound on the hierarchy exists, but the question of the actual existence of such a bound was left completely open. Since then several authors have addressed this problem. Some of what the author asserted was misunderstood, and incorrect conclusions have been drawn from recent computations. It has been claimed that the existence of large hierarchies has been demonstrated. It is the purpose of this paper to refute this claim, to help clarify the situation, and to explain why the status of this problem has in fact not really changed in recent years. (Atomindex citation 11:495808)

20I. Plasma Physics

AD-A084 987/7 PC **A04**/MF **A01**
Naval Research Lab Washington DC
Numerical Study of Optical Ray Retracing in Laser-Plasma Backscatter.
Memorandum rept.,
R. H. Lehmberg, and K. A. Holder. 1 Apr 80, 51p
NRL-MR-4192, AD-E000 423

Optical ray retracing in stimulated Brillouin backscatter from laser-produced plasmas is studied numerically, using a 2-D propagation code (BOUNCE). This code treats steady state behavior in the strong damping limit, and includes self focusing effects. Ray retracing phenomena are grouped into two limiting cases. In the 'whole beam' limit, the pump field at the lens has a broad spatial profile that can be focused to a long narrow waist within the plasma. This geometry selectively amplifies only those initial noise components that are propagating back along the axis, where the net gain is highest. The simulations show that such effects exhibit a pronounced threshold due to self focusing, and disappear when the focal width becomes comparable to the length of the gain medium. In the opposite limit, where the pump radiation at the lens is dominated by small scale transverse structure, the backscatter can reproduce this structure in detail (i.e., exhibit wavefront reversal) when the far field of the pump produces an interference pattern in the plasma.

AD-A085 055/2 PC **A02**/MF **A01**
Yale Univ New Haven CT Dept of Engineering and Applied Science
Wave-Particle Interactions on Relativistic Electron Beams.
Summary rept. 31 Dec 79-1 Jun 80,
Ira B. Bernstein, and Jay L. Hirshfield. 16 May 80, 4p Rept no. 2
Contract N00014-79-C-0588

Summaries are provided on the following topics: Linearized Theory including Axial Magnetic Field; Non-Linear Theory; Quasi-Linear Theory; and Single Particle Theory for Free Electron Laser with a strong Axial Field.

AD-A085 312/7 PC **A09**/MF **A01**
Cornell Univ Ithaca NY Lab of Plasma Studies
Collective Ion Acceleration.
Final rept. 15 Jan 75-14 Jan 80,
John A. Nation. 1980, 197p AFOSR-TR-80-0440
Contract F44620-75-C-0054

Work was conducted on the excitation of slow cyclotron and slow space charge waves in a plasma beam. Observations were made when a planar electron beam was propagated through a strip line. The beam was guided by a homogeneous magnetic field and the excitation achieved with a zero frequency pump wave. Both the space charge and cyclotron waves were excited in the 20-30 GHz interaction and the cyclotron wave in the 70 GHz range. For the first time, independent measurements were made of the effects on growth rate of the homogeneous guide field and the rippled field. Experiments were conducted on the proof-of-principle for a space charge wave accelerator. A large amplitude space charge wave was grown on an electron beam. Phase velocities of 0.25 c, and accelerating fields of 60kV/cm were obtained. (Author)

AD-A085 475/2 PC **A02**/MF **A01**
Naval Research Lab Washington DC
Collective Acceleration with Rotating Relativistic Electron Beams.
Memorandum rept.,
D. N. Spector, K. A. Gerber, R. A. Mahaffey, R. A. Meger, and J. D. Sethian. 11 Apr 80, 14p
NRL-MR-4151, AD-E000 429

Observation of accelerated protons during the injection of rotating relativistic electron beams into neutral hydrogen (50 mTorr to 400 mTorr) indicated that ions from the beam-formed plasma are trapped and accelerated by a potential well at the beamfront. Measurements show that the number of accelerated protons decreases as the beamfront velocity is increased. Moreover, at a given velocity, the number accelerated is relatively insensitive to the neutral gas pressure.

EUR-CEA-FC-981 PC **A03**/MF **A01**
Association Euratom-CEA sur la Fusion, Centre d'Etudes Nucleaires de Fontenay-aux-Roses (France). Dept. de Physique du Plasma et de la Fusion Controlee.
Parametrically Driven Low-Frequency Waves in Weakly Inhomogeneous Magnetized Plasmas.
S. S. Pesic. Dec 78, 45p
U.S. Sales Only.

The linear dispersion relation governing the parametric interaction of a lower hybrid (or an electron plasma) pump wave with a weakly inhomogeneous current-carrying hot cylindrical plasma confined by a helical magnetic field is derived and solved numerically. The coupling parameter, frequency and growth rate of decay instabilities are calculated for a wide range of plasma parameters relevant to lower hybrid plasma heating experiments. It is found that in the outer plasma layer (2< omega sub 0 / omega sub(LH)<approximately 7) short parallel wavelength ion Bernstein quasimodes and ion cyclotron quasimodes are the most unstable low frequency waves. Due to the large convective losses, the pump depletion in the plasma periphery is insignificant for moderate pump electric field intensities. The presence of the pump field is found to have a stabilizing effect on the excitation of short parallel wavelength ion cyclotron current instabilities. In the plasma core (omega sub 0 / omega sub(LH)<2) the short wavelength nonresonant quasimodes and hot ion Bernstein waves have relatively fast growth rates and small group velocities, and consequently they are considerably amplified in the pump wave field. These waves are strongly damped by electron Landau and ion cyclotron harmonic interaction. The presented theoretical results are in good qualitative agreement with current LH plasma heating experiments. (Atomindex citation 11:495633)

IPP-4/177 PC **A02**/MF **A01**
Max-Planck-Inst. fuer Plasmaphysik, Garching (Germany, F.R.).
Recombination Effect on the Expansion Process of the Laser-Produced Plasma in the Absence and Presence of an External Magnetic Field.
S. Sudo. May 79, 16p
U.S. Sales Only.

The change of the ionization ratio of the laser-produced plasma during expansion is calculated with

a simple model. The results for expansion in the absence of a magnetic field are compared with the experimental results obtained by Baumhacker et al. The recombination is not negligible and it takes place mainly in the first stage of expansion. The ionization ratio of the expanding plasma remains distinctly higher in the presence of a magnetic field. However, in order to maintain full ionization in the plasma during the filling process in a magnetic container, the lower initial density is more favorable and the use of a CO sub 2 laser (at least in the final stage of plasma heating) seems necessary in the range of currently possible parameters. (Atomindex citation 11:495647)

IPPJ-349 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Scattering of Lattice Solitons from a Mass Impurity.
N. Yajima. Aug 78, 18p
U.S. Sales Only.

A perturbation theory for the inverse scattering transforms applies to the Toda lattice system with a mass impurity. As an example, scattering of a soliton from an impurity is considered. When the mass of impurity is slightly different from that of host particles, the soliton nearly pass through the impurity without changing its amplitude. (Atomindex citation 11:495657)

IPPJ-358 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Population Inversion in Recombining Hydrogen Plasma.
U. Furukane, T. Yokota, and T. Oda. Nov 78, 25p
U.S. Sales Only.

The collisional-radiative model is applied to a recombining hydrogen plasma in order to investigate the plasma condition in which the population inversion between the energy levels of hydrogen can be generated. The population inversion is expected in a plasma where the three body recombination has a large contribution to the recombining processes and the effective recombination rate is beyond a certain value for a given electron density and temperature. Calculated results are presented in figures and tables. (Atomindex citation 11:495591)

IPPJ-370 PC **A04**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Collisionless Tearing Instabilities.
I. Katanuma, and T. Kamimura. Jan 79, 52p
U.S. Sales Only.

Collisionless tearing modes and the enhanced transport associated with this instability are investigated theoretically and by using a two-and-one-half dimensional particle simulation code in a slab geometry. The effects of electrostatic fields on the instability are also considered. The initial current is found to diffuse along the perturbed magnetic field lines with the observed diffusion coefficient in good agreement with the theoretical prediction. Electrostatic effects have a tendency to enhance the tearing mode growth rate. The growth of the mode is observed to divide into three phases. In multi-mode tearing, a combination of magnetic islands is observed. (Atomindex citation 11:495607)

LA-7684-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Opacity Test Using a Neon-Seeded theta Pinch.
D. B. Thomson. Feb 80, 30p
Contract W-7405-ENG-36

Vacuum ultraviolet (VUV) emission from a neon-seeded high-density theta-pinch has been observed for comparison with theoretical radiation emission calculations. The plasma was created in a 25-cm-long theta-coil with 90-kG field having a 3.0- mu s quarter period. A gas fill of 1 torr of helium + 2% neon was used. Observation of the HeII 4686 line/continuum ratio gave an electron temperature of 25 +- 4 eV. Shadowgraphs of the plasma radius, taken with a ruby laser, gave an electron density of 0.9 +- 0.09 x 10 exp 18 cm exp -3 . The VUV emission was observed in radial view and with time resolution with a 2.2-m grazing-incidence monochromator equipped with a photomultiplier and p-terphenyl scintillator. Thin foils of carbon and aluminum were used as filters to absorb stray light and pass emission in the 44- to 100-A region. (ERA citation 05:021475)

LA-8261-MS PC **A03**/MF **A01**
Los Alamos Scientific Lab., NM.
Zero Dimensional Plasma Model and the Study of the Initial Performance of the ZT-40 Experiment.
S. Ortolani. Feb 80, 46p
Contract W-7405-ENG-36

A plasma zero-dimensional model is described and some results obtained to study the initial performance of the ZT-40 experiment are discussed. (ERA citation 05:021482)

NRL-Memo-4192 PC **A04**/MF **A01**
Naval Research Lab., Washington, DC.
Numerical Study of Optical Ray Retracing in Laser-Plasma Backscatter.
R. H. Lehmberg, and K. A. Holder. 1 Apr 80, 51p
Contract ES-77-A-01-6021

Optical ray retracing in stimulated Brillouin backscatter from laser-produced plasmas is studied numerically, using a 2-D propagation code (BOUNCE). This code treats steady state behavior in the strong damping limit, and includes self focusing effects. Ray retracing phenomena are grouped into two limiting cases. In the whole beam limit, the pump field at the lens has a broad spatial profile that can be focused to a long narrow waist within the plasma. This geometry selectively amplifies only those initial noise components that are propagating back along the axis, where the net gain is highest. The simulations show that such effects exhibit a pronounced threshold due to self focusing, and disappear when the focal width becomes comparable to the length of the gain medium. In the opposite limit, where the pump radiation at the lens is dominated by small scale transverse structure, the backscatter can reproduce this structure in detail (i.e., exhibit wavefront reversal) when the far field of the pump produces an interference pattern in the plasma. (ERA citation 05:021535)

N80-26151/4 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Effect of Ion Dynamics on Relativistic Nonlinear Plasma Oscillations.
A. C. L. Chian. Apr 80, 37p INPE-1704-RPE/122-REV
Revised.

Relativistic nonlinear longitudinal waves in a cold plasma are studied by including ion dynamics in the analysis. All wave velocities are considered. Wave solutions with arbitrary plasma stream velocities are obtained by a suitable choice of a dynamic parameter. The solutions of the problem can be reduced to two equations related to conservation of energy and momentum of the system. For large amplitude waves, ion dynamics play an important role in the wave properties.

N80-26152/2 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Relativistic Nonlinear Cyclotron Waves in a Hot Electron-Ion Plasma.
A. C. L. Chian. Apr 80, 14p INPE-1723-RPE/128-REV
Revised. Submitted for Publication.

The propagation of relativistic nonlinear circularly polarized waves along a uniform magnetic field in a streaming hot electron-ion plasma is examined. It is shown that, in the presence of extremely intense waves, the ions play an important role on wave properties. In addition, it is shown that a finite temperature increases the effective inertia of plasma.

N80-26153/0 PC **A03**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
Two-Dimensional Equilibrium of Field-Reversed Ion Rings.
G. O. Ludwig. May 80, 46p INPE-1724-RPE/129-REV
Revised.

The axially symmetric equilibrium of intense ion rings is examined for field-reversed configurations. A rigid rotor model is assumed for the ion distribution, with background or accompanying electrons providing space charge neutralization. This equilibrium configuration is described by three macroscopic quantities, the ring particle density, the ring pressure, and the azimuthal component of the vector potential. Within the Vlasov-Maxwell framework, these quantities must satisfy Ampere's law and the pressure balance equation. The system of equations is completed assuming that the pressure and the density satisfy a general power law (equation of state). The equilibrium solution for intense ion layers (one dimensional problem) is examined in the general case, but for intense ion rings (two dimensional problem) the analysis is restricted to the uniform particle density case. The sharp boundary that separates the constant density and zero density regions is approximated by a stepwise function and determined for several values of the ring parameters.

N80-26154/8 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Institute of Plasma Physics.
New Type of Ray Trajectory of Thermal Mode in an Inhomogeneous Magnetoplasma.
H. Sanuki, T. Watanabe, and T. Ohnuma. Mar 80, 17p IPPJ-447

The three dimensional behavior of the ray trajectory of thermal modes are numerically investigated. The ray trajectory of the thermal mode is shown to represent a different type of ray characteristic from the usual resonance cone. The preliminary numerical results associated with the ray tracing of thermal mode in an inhomogeneous magnetoplasma are presented.

N80-26155/5 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Institute of Plasma Physics.
A Disc LAB6 Cathode for Plasma Production in Magnetic Field.
J. Uramoto, K. Ishii, and Y. Kubota. Mar 80, 10p IPPJ-448

A disc LaB6 cathode is proposed in order to improve demerits of a cylindrical LaB6 cathode when a plasma source is produced by a discharge in a magnetic field.

N80-26156/3 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Nonlinear Alfven Wave in an Ultra-Relativistic Electron-Positron Plasma.
J. I. Sakai, and T. Kawata. Mar 80, 16p IPPJ-449

A nonlinear Alfven wave propagating parallel to a constant magnetic field in an ultrarelativistic electron-positron plasma is investigated in the frame of a covariant two fluid model equation. The basic equations are derived from the Einstein equation, Maxwell equations, and the continuity equation in the case of special relativity. The derivation for the equation describing the nonlinear evolution of a circular polarized Alfven wave is presented. Finally, some stational solutions (bright solitons, kink solution, spiky soliton with rapid phase rotation) are discussed.

N80-26157/1 PC **A02**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Waves in an Ultra-Relativistic Electron-Positron Plasma.
J. I. Sakai, and T. Kawata. Mar 80, 15p IPPJ-450

Basic equations describing the macroscropic behavior of an ultrarelativistic plasma are formulated in a covariant form. Waves in an electron-positron plasma are investigated in the frame of a two fluid model equation. Dispersion relations for electrostatic waves, electromagnetic waves and Alfven waves propagating parallel to a constant magnetic field are shown. In the case that both electron and positron gases have the same temperature, there does not exist the slow mode which corresponds to the ion acoustic wave. Right and left circular polarized waves propagate with the same dispersion relation which is different from that of the nonrelativistic electron-ion plasma.

N80-26160/5 PC **A03**/MF **A01**
Nagoya Univ. (Japan). Inst. of Plasma Physics.
Particle Simulation Studies on Behavior of Laser-Produced High-beta Plasma in a Magnetic Field.
M. Aizawa, T. Sekiguchi, Y. Ohsawa, K. Sato, and T. Kamimura. Mar 80, 42p IPPJ-452

Macroscopic and microscopic behaviors of the laser produced high-beta plasma were studied by

the magnetostatic particle simulation code. The expansion process of the plasma, the rethermalization phenomena, the structure of high-beta sheath and the instability are examined in detail. As the plasma radius becomes maximum, the shell structure of the density appears. The thermalization of the expansion energy occurs and the instability arises in this shell. This instability is similar to that observed in the experiments and the growth rate is almost equal to that of the lower hybrid drift instability. When the expansion stops, the width of the sheath is nearly equal to the hybrid Larmor radius.

N80-26161/3 PC **A05**/MF **A01**
Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
Ion Extraction from a Plasma.
Ph.D. Thesis. Progress Report, 1 Dec. 1979 - 1 Dec. 1980.
G. Aston. Jun 80, 93p NASA-CR-159849
Contract NGR-06-002-112

An experimental investigation of the physical processes governing ion extraction from a plasma is presented. The screen hole plasma sheath of a multiaperture ion accelerator system is defined by equipotential plots for a variety of accelerator system geometries and operating conditions. A sheath thickness of at least fifteen Debye lengths is shown to be typical. The electron density variation within the sheath satisfies a Maxwell Boltzmann density distribution at an effective electron temperature dependent on the discharge plasma primary to Maxwellian electron density ratio. Plasma ion flow up to and through the sheath is predominately one dimensional and the ions enter the sheath with a modified Bohm velocity. Low values of the screen grid thickness to screen hole diameter ratio give good ion focusing and high extracted ion currents because of the effect of screen webbing on ion focusing.

N80-26162/1 PC **A04**/MF **A01**
Argonne National Lab., IL.
Modified NASA-Lewis Chemical Equilibrium Code for Mhd Applications.
R. A. Sacks, H. K. Geyer, S. J. Grammel, and E. D. Doss. Dec 79, 60p NASA-TM-80903, ANL/MHD-79-15
Contract W-31-109-ENG-38

A substantially modified version of the NASA-Lewis Chemical Equilibrium Code was recently developed. The modifications were designed to extend the power and convenience of the Code as a tool for performing combustor analysis for MHD systems studies. The effect of the programming details is described from a user point of view.

N80-26173/8 PC **A08**/MF **A01**
Centre de Recherches en Physique de l'Environnement Terrestre et Planetaire, Orleans (France).
Contribution to the Study of Electrostatic and Electromagnetic Waves Near the Lower Hybrid Frequency in Ionospheric Plasma Contribution a l'Etude des Ondes Electrostatiques et Electromagnetiques au Voisinage de la Frequence Hybride Basse dans le Plasma Ionospherique.
Ph.D. Thesis - Orleans Univ.
M. Hamelin. 1978, 152p CRPE-NT-61
Text in French.

Wave dispersion near the lower hybrid frequency in a homogeneous plasma with several ionic types was studied. The different macroscopic theories were reviewed: cold pasma theory; adiabatic theory in electrostatic approximation; and complete adiabatic theory. Electrostatic waves in perpendicular propagation and in quasiperpendicular propagation were examined. A complete study of electromagnetic and electrostatic wave progation in a weakly inhomogenous environment near the lower hybrid frequency is exposed in the frame of the adiabatic theory. The response to a point source electric impulse in a homogenous environment was investigated with reference to moving plasma.

PAT-APPL-6-021 293 PC **A03**/MF **A01**
Department of Energy, Washington, DC.
Generating End Plug Potentials in Tandem Mirror Plasma Confinement by Heating Thermal Particles So as to Escape Low Density End Stoppering Plasmas.
Patent Application,
D. E. Baldwin, and B. G. Logan. Filed 16 Mar 79, 38p
Contract W-7405-ENG-48
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The invention provides a method and apparatus for raising the potential of a magnetic mirror cell by pumping charged particles of the opposite sign of the potential desired out of the mirror cell through excitation, with the pumping being done by an externally imposed field at the bounce frequence of the above charged particles. These pumped simple mirror cells then provide end stoppering for a center mirror cell for the tandem mirror plasma confinement apparatus. For the substantially complete pumping case, the end plugs of a tandem mirror can be up to two orders of magnitude lower in density for confining a given center mirror cell plasma than in the case of end plugs without pumping. As a result the decrease in recirculating power required to keep the system going, the technical state of the art required, and the capital cost are all greatly lowered. (ERA citation 05:024977)

PAT-APPL-6-022 894 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Production of Field-Reversed Mirror Plasma with a Coaxial Plasma Gun.
Patent Application,
C. W. Hartman, and J. W. Shearer. Filed 22 Mar 79, 17p
Contract W-7405-ENG-48
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

The use of a coaxial plasma gun to produce a plasma ring which is directed into a magnetic field so as to form a field-reversed plasma confined in a magnetic mirror. Plasma thus produced may be used as a target for subsequent neutral beam injection or other similarly produced and projected plasma rings or for direct fusion energy release in a pulsed mode. (ERA citation 05:024976)

PATENT-4 166 760
Not available NTIS
Department of Energy, Washington, DC.
Plasma Confinement Apparatus Using Solenoidal and Mirror Coils.
Patent,
T. K. Fowler, and W. C. Condit. Filed 4 Oct 77, patented 4 Sep 79, 10p PAT-APPL-839 226
Supersedes PAT-APPL-839 226-77.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A plasma confinement apparatus is described, wherein multiple magnetic mirror cells are linked by magnetic field lines inside of a solenoid with the mirroring regions for adjacent magnetic mirror cells each formed by a separate mirror coil inside of the solenoid. The magnetic mirror cells may be field reversed. (ERA citation 05:025046)

PPPL-1520 PC **A03**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
QED-1 Device and Measurements of Gettering Efficiency for a Simulated Divertor Plasma.
D. K. Owens, and M. Yamada. Mar 80, 44p
Contract EY-76-C-02-3073

The QED-1 device at PPL has provided gettering efficiency data for neutralized hydrogen plasma on titanium. The hollow-anode arcjet produces a plasma column 1 cm in diameter with 10 exp 12 < n/sub e/ < 10 exp 15 cm exp -3 and T/sub i/ approx. < T/sub e/ = 3-10 eV, confined by an axial magnetic field of 1-6 kG. The gettering measurements are based on monitoring neutral gas density with respect to time in the divertor simulation chamber of QED-1. The present results indicate that the plasma particles lose their charge and most of their energy when they strike the neutralizer plate. (ERA citation 05:021476)

PPPL-1633 PC **A03**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Charge Exchange as a Recombination Mechanism in High-Temperature Plasmas.
R. A. Hulse, D. E. Post, and D. R. Mikkelsen. Mar 80, 38p
Contract EY-76-C-02-3073

Charge exchange with neutral hydrogen is examined as a recombination mechanism for multicharged impurity ions present in high-temperature fusion plasmas. At sufficiently low electron densities, fluxes of atomic hydrogen produced by either the injection of neutral heating beams or the background of thermal neutrals can yield an important or even dominant recombination process for such ions. Equilibrium results are given for selected impurity elements showing the altered ionization balance and radiative cooling rate produced by the presence of various neutral populations. A notable result is that the stripping of impurities to relatively non-radiative ionization states with increasing electron temperature can be postponed or entirely prevented by the application of intense neutral beam heating power. A time dependent calculation modelling the behavior of iron in recent PLT tokamak high power neutral beam heating experiments is also presented. (ERA citation 05:021483)

PPPL-1644 PC **A03**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Observations of Giant Recombination Edges on PLT Tokamak Induced by Particle Transport.
K. Brau, S. von Goeler, M. Bitter, R. D. Cowan, and D. Eames. Mar 80, 30p
Contract EY-76-C-02-3073

Characteristic steps in the continum spectrum of high temperature tokamak plasmas associated with recombination radiation from impurity ions were observed. During special argon-seeded discharges on the Princeton Large Torus (PLT) tokamak the x-ray spectrum exhibited large enhancements over the bremsstrahlung continuum beginning with energies of 4.1 keV. This corresponds to the radiative capture of free electrons by hydrogen-like argon into the ground state of helium-like argon. A simple particle diffusion model is proposed, with the Ar XVIII radial profiles evaluated from the size of the recombination edges. For the case of moderate density (< n/sub e/ > approx. 3 x 10 exp 13 cm exp -3) and temperature (T/sub e/(0) approx. 1.5 keV) discharges the outward radial transport velocity is found to be approximately 10 m/sec. (ERA citation 05:021477)

PPPL-1652 PC **A02**/MF **A01**
Princeton Univ., NJ. Plasma Physics Lab.
Noncanonical Hamiltonian Density Formulation of Hydrodynamics and Ideal MHD.
P. J. Morrison, and J. M. Greene. Apr 80, 15p
Contract EY-76-C-02-3073

A new Hamiltonian density formulation of a perfect fluid with or without a magnetic field is presented. Contrary to previous work the dynamical variables are the physical variables, rho, v, B, and s, which form a noncanonical set. A Poisson bracket which satisfies the Jacobi identity is defined. This formulation is transformed to a Hamiltonian system where the dynamical variables are the spatial Fourier coefficients of the fluid variables. (ERA citation 05:021484)

UCRL-84284 PC **A02**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
Plasma Focus Experiments with DT-Filled Microballoons.
H. L. Sahlin, T. H. Hasegawa, W. L. Pickles, D. F. Price, and T. E. Wainwright. 1978, 4p CONF-781247-7
Contract W-7405-ENG-48
International conference on energy storage, compression and switching, Venice, Italy, 5 Dec 1978.

Experiments with DT-filled glass microballoons positioned near the pinch region of a plasma focus have resulted in the production of neutrons which do not appear to be due to D-T reactions. (ERA citation 05:021478)

20J. Quantum Theory

AD-A085 368/9 PC **A02**/MF **A01**
Rochester Univ NY Dept of Chemistry
A New Propagation Method for the Radial Schroedinger Equation, Application to Close-Coupled Equations,
Paul L. DeVries, and Thomas F. George. 4 Jul 79, 9p AFOSR-TR-80-0327

Contract F49620-78-C-0005, Grant NSF-CHE77-27826
Pub. in Molecular Physics, v39 n3 p701-707 1980. Sponsored in part by Grant NSG-2198.

No abstract available.

CONF-790477-2 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Theoretical Method for Determining the Three-Particle Distribution Function of Classical Systems.
E. Johnson. 1979, 7p
Contract W-7405-ENG-26
Annual meeting of national organization for the professional advancement of black chemists and chemical engineers, Houston, TX, USA, 16 Apr 1979.

Equilibrium statistical mechanics is considered. A method that should yield accurate three-particle distribution functions is presented. None of the current methods is successful. It appears that the new equation presented may be used with the first and second equations in the YBG hierarchy to obtain exact single-particle, pair, and triplet distribution functions. It should be easy to generalize the results to the n-particle distribution function. (ERA citation 05:021457)

JINR-E-2-12270 PC **A03**/MF **A01**
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics.
Notion of World Lines and Scattering Matrix for Directly Interacting Relativistic Point Particles.
V. V. Molotkov, and I. T. Todorov. 1979, 34p
U.S. Sales Only.

The notion of world lines is studied in the constraint Hamiltonian formulation of relativistic point particle dynamics. The particle world lines are shown to depend (in the presence of interaction) on the choice of the equal time hyperline. However, the relative motion of a two-particle system and the (classical) S-matrix are independent of this choice. It is concluded that particle trajectories should not be regarded as strict observables in the classical theory of relativistic particles. (Atomindex citation 11:495389)

20K. Solid Mechanics

AD-A084 995/0 PC **A15**/MF **A01**
SRI International Menlo Park CA
SRI PUFF 8 Computer Program for One-Dimensional Stress Wave Propagation. Volume 2.
Final rept. Sep 77-Aug 78,
L. Seaman, and D. R. Curran. Mar 80, 338p
ARBRL-CR-00420, AD-E430 434
Contract DAAK11-77-C-0083

SRI PUFF is a Lagrangian finite difference computer program for calculating one-dimensional stress wave propagation through solid, liquid, gaseous, and porous materials. The calculational procedure is the standard leapfrog method of von Neumann and Richtmyer using artificial viscosity to smooth shock fronts. Planar, cylindrical, and spherical flow are treated. The constitutive relations include the standard Mie-Grueneissen equation of state and elastic, plastic (Mises or Coulomb) work-hardening deviator stress relations with thermal softening. Other pressure relations provided are a polytropic gas for explosives, GRAY and Philco-Ford three-phase equations of state, and a tabular pressure-volume relations. Special deviator stress models include the standard viscoelastic model, a Bauschinger model, dislocation models, and a nonlinear work-hardening model. Ductile and brittle fracture and shear banding are provided by nucleation and growth models. Porous materials may be represented by the Seaman-Linde model, Holt model, Herrmann P-alpha model, a cap plasticity model, and variable modulus model, or by a linear viscous void compacting model. The code is constructed for easy insertion of additional material models. The number of extra variables required for each cell for a material model can be specified in the input deck. This manual includes many sample problems, a derivation of the flow equations, discussion of material models, and an outline of other aspects of wave propagation calculations.

AD-A085 113/9 PC **A04**/MF **A01**
Lehigh Univ Bethlehem PA Center for the Application of Mathematics
Stability of a Thick Elastic Plate Under Thrust.
Technical rept.,
K. N. Sawyers, and R. S. Rivlin. Mar 80, 52p
Rept no. CAM-100-34
Contract N00014-76-C-0235

When a rectangular plate of incompressible neo-Hookean elastic material is subjected to a thrust, bifurcations of the flexural or barreling types become possible at certain critical values of the compression ratio. The states of pure homogeneous deformation corresponding to these critical compression ratios are states of neutral equilibrium. Their stability is investigated on the basis of an energy criterion, without restriction on the thickness of the plate. The critical state corresponding to the lowest order flexural mode is found to be stable (unstable) if the aspect ratio (thickness/length) is less (greater) than about 0.2. Agreement with the classical Euler theory is established in the limiting case of small aspect ratio. (Author)

AD-A085 195/6 PC **A03**/MF **A01**
Battelle Columbus Labs OH
Whither Dynamic Fracture Mechanics
Interim rept.,
M. F. Kanninen. May 80, 26p
Contract N00014-77-C-0576

The experimental basis for the necessity of a dynamic characterization of crack run/arrest events is reviewed. Current anomalies in the use of linear elastodynamic treatments--apparent geometry and load rate dependence of the dynamic fracture toughness property--are discussed. A review of concurrent work in plastic fracture mechanics is given as a possible basis for circumventing these anomalies. (Author)

AD-A085 196/4 PC **A02**/MF **A01**
Battelle Columbus Labs OH
Dynamic Crack Propagation in Precracked Cylindrical Vessels Subjected to Shock Loading.
Interim rept.,
C. H. Popelar, P. C. Gehlen, and M. F. Kanninen. Aug 79, 9p
Contract N00014-77-C-0576
Prepared in cooperation with Ohio State Univ., Columbus. Dept. of Engineering Mechanics.

Previous work has shown that a speed-independent dynamic fracture toughness property can be used in an elastodynamic analysis to describe crack initiation and unstable propagation under impact loading. In this paper, a further step is taken by extending the analysis from simple laboratory test specimens to treat more realistic crack-structure geometries. A circular cylinder with an initial part-through wall crack subjected to an impulsive loading on its inner surface is considered. The crack is in a radial-axial plane and has its length in the axial direction long enough that a state of plane strain exists at the center of the crack. Crack growth initiation and propagation through the wall is then calculated. It is found that, once initiated, crack propagation will continue until the crack penetrates the wall. Crack arrest within the wall does not appear to be possible under the conditions considered in this paper. (Author)

AD-A085 262/4 PC **A08**/MF **A01**
Naval Underwater Systems Center New London CT New London Lab
Elastic Wave Propagation in Inhomogeneous Lossy Media with Special Reference to Powders.
Technical rept.,
Geoffrey Roy Akers. 28 Apr 80, 151p Rept no. NUSC-TR-6265

Elastic wave propagation in actual fact is the transport of energy in a medium that acts as a sink for this energy. Engineering and physical applications rely upon an understanding of the wave propagation process to model systems and describe the physical world, and, as such one desires to broaden his knowledge of the actual propagation process in real inhomogeneous media. In this work, on examines the vector wave equation developed for an anisotropic, inhomogeneous lossy medium with a set of 'effective' Lame' constants derived from microscopic considerations of the medium and develops a composite loss function, L, to account for the energy loss mechanisms that occur as the wave propagates. This loss function is incorporated into the general equations of motion and series solutions for bulk, and surface waves in the inhomogenous lossy medium are derived. The displacement fields are examined over the frequency regime in the near and far field for the waves. The effective Lame' parameters are included in the solution, and their contribution, as well as the frequency contribution to the wave field is seen. Higher orders of scattering and diffraction are seen as well as the an harmonicites and nonlinear effects of losses. These effects may be observed in the general wavefield description. Also the effect of losses on the dispersion behavior is observed as a frequency shift of the wave.

AD-A085 328/3 Not available NTIS
Naval Research Lab Washington DC Shock and Vibration Information Center
The Shock and Vibration Digest. Volume 12, Number 5.
May 80, 119p
See also Volume 12, Number 4, AD-A084 108.
Availability: Naval Research Lab., Attn: Code 5804. Washington, DC 20375. Annual Rate $100.00 (No copies furnished by DTIC.

Partial contents: Shock in Solids--Army materials research and applications; Cross-flow-induced instabilities of circular cylinders; and Abstract from the Current Literature

AD-A085 383/8 PC **A02**/MF **A01**
California Univ San Diego La Jolla Dept of Chemistry
Analytic Theory of Extrema, II: Application to Non-Linear Oscillators,
V. Seshadri, B. J. West, and K. Lindenberg. 20 Jun 79, 19p
Contract N00014-78-C-0497
Pub. in Jnl. of Sound and Vibration, v68 n4 p553-570 1980.

No abstract available.

AD-A085 502/3 Not available NTIS
Maryland Univ College Park Dept of Aerospace Engineering
Improved Extended Field Method Numerical Results,
S. Chander, B. K. Donaldson, and H. M. Negm. 30 Oct 78, 13p
Contract N00014-76-C-0872
Prepared in cooperation with Control Data Corp., Rockville, MD.
Availability: Pub. in Jnl. of Sound and Vibration, v66 n1 p39-51 1979 (No copies furnished by DTIC/NTIS.

No abstract available.

AD-A085 503/1 Not available NTIS
Maryland Univ College Park Dept of Aerospace Engineering
Extended Field Method Free Vibration Solutions,
S. Chander, and B. K. Donaldson. 30 Oct 78, 10p
Contract N00014-76-C-0872
Prepared in cooperation with Control Data Corp., Rockville, MD.
Availability: Pub. in Jnl. of Sound and Vibration, v66 n1 p53-62 1979 (No copies furnished by DTIC/NTIS).

No abstract available.

AD-A085 504/9 Not available NTIS
Maryland Univ College Park Dept of Aerospace Engineering
Converged Stress Solutions in Thin Plates by the Extended Field Method,
B. K. Donaldson, S. Chander, and H. M. Negm. 27 Oct 78, 14p
Prepared in cooperation with Control Data Corp., Rockville, MD.
Availability: Pub. in International Jnl. for Numerical Methods in Engineering, v15 p259-272 1980 (No copies furnished by DTIC/NTIS.

No abstract available.

AD-A085 564/3 PC **A02**/MF **A01**
California Univ Berkeley Dept of Mechanical Engineering

A Remark on the Use of the Decomposition F = F sub e F sub p in Plasticity.
Technical rept.,
J. Casey, and P. M. Naghdi. Jan 80, 14p Rept no. UCB/AM-80-4
Contract N00014-75-C-0148

This note contains a brief discussion of the limitations involved when use is made of a multiplicative decomposition in plasticity. In particular, it is shown that if full invariance requirements are involved, then theories employing the multiplicative decomposition lose the generality attributed to them in some of the recent literature on the subject. (Author)

AD-A085 649/2 PC **A02**/MF **A01**
Maryland Univ College Park Dept of Aerospace Engineering
An Extended Method Solution for a Pulse Loaded Thin Plate.
Interim rept.,
Bruce K. Donaldson, and N. B. Starkey. Apr 80, 12p Rept no. AE-80-1
Contract N00014-76-C-0872

This paper deals with a new extension of a weighted residual method of analysis called the extended field method. The extended field method is applied for the first time to the problem of the transient vibration of a uniformly thin elastic plate. Numerical results have been obtained which validate the analysis procedure and show better solution convergence that is obtainable by standard methods of analysis for the same number of degrees of freedom. Further studies are necessary to obtain still better convergence. (Author)

AD-A085 766/4 MF **A01**
Sri International Menlo Park CA
TROTT Computer Program for Two-Dimensional Stress Wave Propagation. Volume III.
Final rept. Sep 77-Aug 78,
L. Seaman, and D. R. Curran. Apr 80, 149p
ARBRL-CR-00428, AD-E430 455
Contract DAAK11-77-C-0083
Availability: Microfiche copies only.

TROTT is a Lagrangian finite-difference computer program for calculating two-dimensional stress wave propagation through solid, porous, and composite materials. The stress waves may be caused by impact, detonation of an explosive, or a prescribed velocity. The calculational procedure is the standard leapfrog method of von Neumann and Richtmyer, using artificial viscosity to smooth shock fronts. Quadrilateral or triangular cells are used. The momentum relations are derived by treating the cells as finite elements. Axisymmetric or planar flow can be handled. The constitutive relations include the standard Mie-Gruneisen equation-of-state and elastic-plastic, work-hardening deviator stress relations. A polytropic gas and detonating flow relations are provided for explosives. Ductile and brittle fracture and shear banding are provided by nucleation and growth models. Porous materials can be represented by a cap plasticity model. A model for layered composites is also present. The code is constructed for easy insertion of additional material models. The number of extra variables required for each cell for a material model can be specified on an input card. This manual includes many sample problems, a derivation of the flow equations, and a discussion of material models.

AD-A085 800/1 PC **A06**/MF **A01**
Aeronautical Research Associates of Princeton Inc NJ
A Continuum Theory of Equilibrium of Irreversible Processes in Solids.
Final rept. 15 Apr 76-31 Jan 79,
Thomas B. McDonough. Jan 79, 106p Rept no. ARAP-395
Contract N00014-76-C-0809

A theory is presented to describe the coupled thermal and mechanical behavior of solids which exhibit irreversibility. The developments presented are restricted to definitions and analyses of 'equilibrium states.' The foundations of the theory embody the following assumptions: (1) the local equilbrium state is fully characterized by three state variables - i.e. the deformation gradient, the entropy density, and a substate variable, (2) a caloric equation of state and stress and temperature relations exist, (3) there is a bounded stable equilibrium region in state-space, (4) a stable equilibrium state satisfies a statement of static stability, and (5) an 'equilibrium process' may be represented by a continuous path in the stable equilibrium region. The meaning of 'equilibrium state' is clarified by considering global (static) stability. Two types are defined and analyzed; Global Adiabatic Stability and Global Adiabatic Mechanical Stability with Fixed Boundary. An equivalence between the latter and the definition of equilibrium state is proven. Several ideas for the further development of this theory are discussed in the concluding section. (Author)

N80-25696/9 PC **A03**/MF **A01**
Royal Aircraft Establishment, Farnborough (England).
The Concept of Effective Stress Applied to Elasticity and to Viscoplasticity in the Presence of Anisotropic Damage.
J. L. Chaboche. Feb 80, 31p RAE-LIB-TRANS-2039, BR74076
Transl. into English of "Le Concept de Contrainte Effective Applique a l'Elasticite et a la Viscoplasticite en Presence d'UN Endommagement Anisotrope", Rept. Onera-1979-77 Onera, Paris, 1979. Presented to the 115TH Euromech Congr., Grenoble, France, 19-22 Jun. 1979.

The complex problems posed by the anisotropy which affects both the elastic behavior and the viscoplastic behavior are discussed. It is shown how a damage tensor of the fourth order can be introduced through the concept of effective stress in order to take into consideration the effect of the damage on the elastic behavior, on the basis of results furnished by homogenization techniques. A three dimensional law of anisotropy is proposed for creep damage, introducing a minimum number of characteristic coefficients. The possibilities of this law are evaluated for the case of the traction torsion of thin tubes and are compared with previous formulations.

20L. Solid-State Physics

AD-A084 874/7 PC **A02**/MF **A01**
Princeton Univ NJ Dept of Electrical Engineering and Computer Science
Structure Determination for the (110) Surface of Zincblende Structure Compound Semiconductors.
C. B. Duke, R. J. Meyer, A. Paton, P. Mark, and A. Kahn. 7 Feb 79, 8p Rept no. TR-59-ONR
Contract N00014-75-C-0394, Grant DAAG29-77-G-0116
Pub. in Jnl. of Vacuum Science and Technology, v16 n5 p1252-1257 Sep/Oct 79. Sponsored in part by Grant NSF-ENG75-18529.

No abstract available.

AD-A084 877/0 PC **A02**/MF **A01**
California Univ Santa Barbara Dept of Electrical and Computer Engineering
Measurement of Isotype Heterojunction Barriers by C-V Profiling.
H. Kroemer, Wu-Yi Chien, J. S. Harris, Jr., and D. D. Edwall. 15 Oct 79, 6p
Contract N00014-77-C-0430
Pub. in Applied Physics Letters, v36 n4 p295-297, 15 Feb 80.

No abstract available.

AD-A085 140/2 PC **A02**/MF **A01**
Maryland Univ College Park
Surface Effects on Plastic Deformation.
Annual rept. 1 May 79-30 Apr 80,
R. J. Arsenault, and I. R. Kramer. 14 May 80, 19p ONR-TR-80-1
Contract N00014-79-C-0392

The present computer simulation study of the dislocation distribution near the surface is based upon a modified one-dimensional dislocation model which considers the line tension of a dislocation loop, and the image forces. If the dislocations are generated from a surface source and move by thermal activation over randomly distributed short range barriers, an inverse pile-up is created. A dislocation density gradient exists up to a depth of approximately 60 micrometers, for a total of twenty dislocations generated. During unloading, the last few dislocations generated leave the crystal rapidly, and within three hours to two weeks the dislocation density gradient essentially disappears (depending upon the parameters used). This is in agreement with the experimental results. (Author)

AD-A085 261/6 PC **A03**/MF **A01**
Northwestern Univ Evanston IL Dept of Civil Engineering
Crack-Tip Fields for Fast Fracture of an Elastic-Plastic Material.
Interim rept.,
J. D. Achenbach, M. F. Kanninen, and C. H. Popelar. Dec 79, 32p
Contract N00014-76-C-0063
Prepared in cooperation with Battelle Columbus Labs., Ohio under contract no. N00014-77-C-0576.

An asymptotic analysis of the near-tip fields is given for transient crack propagation in an elastic-plastic material. The material is characterized by J2 flow theory together with a bilinear effective stress-strain curve. Both plane stress and plane strain conditions have been considered. Explicit results are given for the order of the crack-tip singularity, the angular position at which unloading occurs, and the angular variation of the near-tip stresses, all as functions of the crack-tip speed and the ratio of the slopes of the two portions of the bilinear stress-strain relation. (Author)

AD-A085 303/6 PC **A02**/MF **A01**
Princeton Univ NJ
Free Surface Properties of III-V Compound Semiconductor Surfaces.
Final rept. 1 Apr 74-31 Mar 80,
A. Kahn. Jun 80, 20p ARO-11671.18-EL, ARO-14710.12-EL
Grants DAHC04-74-G-0133, DAAG29-77-G-0116

Studies of free compound semiconductor surfaces as well as gas-solid and metal-solid interaction are summarized. An experimental and theoretical analysis of the GaAs(110) surface reconstruction was conducted and applied to three additional compounds: InSb, InP and ZnTe. Attempts were made to relate the type and the magnitude of the surface reconstruction of these materials to the covalent-ionic character of the bonding. Knowledge of the atomic reconstructions of these surfaces was used to investigate the reactivity of semiconductor surfaces (GaAs(110)) with gas (oxygen) and metal (aluminum) atoms. These multicomponent systems are at the center of the author's essays to understand the chemistry of these surfaces and its relationship with their atomic reconstruction. Using Low Energy Electron Diffraction (LEED) as the principal tool to investigation, structural information has been obtained which correlates chemical and electronic information obtained by other surface analysis techniques. (Author)

AD-A085 435/6 PC **A02**/MF **A01**
Massachusetts Inst of Tech Lexington Lincoln Lab
Crystalline Silicon on Insulators by Graphoepitaxy.
Journal article,
Michael W. Geis, Dale C. Flanders, Dimitir A. Antoniadis, and Henry I. Smith. 1979, 5p MS-5107A, ESD-TR-79-348
Contract F19628-80-C-0002, ARPA Order-2006
Pub. in Proceedings of International Electron Devices Meeting, p210-212 Dec 79.

No abstract available.

AD-A085 524/7 PC **A02**/MF **A01**
Wisconsin Univ-Milwaukee Dept of Physics
Electromigration and Theromomigration in Metals.
Final rept. 30 Jun 76-31 Dec 79,
Richard S. Sorbello. 15 Feb 80, 8p AFOSR-TR-80-0401
Grant AFOSR-76-3082

The object of this research was to investigate theoretically the driving force for electromigration and thermomigration in metals. The driving force for electromigration was shown to be equal to the

local electric field accompanying electron transport. The force was determined from the linear response expression of Kumar and Sorbello using both the Green's function formalism and the Kohn-Luttinger formalism. Corrections to previous force expressions were derived. The effects of atomic configuration on electromigration was investigated within a pseudoatom picture. Application was made to lattice distortion, fast-diffusers, grain boundaries and isotope effects. Calculations were made of the driving force in liquid-metal alloys and were found to be in agreement with experiment. The kohn-Luttinger formalism was applied to electromigration in an inversion layer. The diving force for thermomigration was examined. A linear-response expression was derived for the electronic component of the driving force.

AD-A085 565/0 PC A03/MF A01
Air Force Wright Aeronautical Labs Wright-Patterson AFB OH
Characterization of III-V Compound Semiconductor Device Materials.
Final rept. 1 Jul 75-1 Oct 79,
D. C. Reynolds. Feb 80, 35p Rept no. AFWAL-TR-80-1016

The objective of this task has been the electrical, optical, and magneto-optical characterization of the intrinsic and extrinsic properties of compound semiconductors, primarily from the III-V group of materials. Photoluminescent techniques were used to identify both the intrinsic and extrinsic properties of the materials. Intrinsic properties such as energy band gaps, effective mass parameters, refractive indices, dielectric functions, exciton binding energies and lattice vibration frequencies were determined. Extrinsic properties including activation energies of foreign impurities, binding energy of excitons to foreign impurities and the energies of complexes were established. Transport measurements were used to measure carrier mobilities and electrical conductivity as well as carrier concentrations. These measurements as a function of temperature make it possible to determine the number of donors (N sub D) and the number of acceptors (N sub A) and therefore the compensation ratio in the material. Local vibrational mode spectroscopy was used as a characterization tool to identify specific impurities such as C and Si in GaAs. From the vibrational energy the site location of the impurity can be determined. These characterization techniques have been very successful in evaluating the quality of materials and have been very helpful to the crystal growing program which has been successful in growing very high quality materials. (Author)

AD-A085 673/2 PC A03/MF A01
IBM Thomas J Watson Research Center Yorktown Heights NY
Spectroscopic Studies of the Electronic Structure of Metal-Semiconductor and Vacuum-Semiconductor Interfaces.
Final rept. 1 Oct 76-31 Oct 79,
Dean E. Eastman. 24 Mar 80, 37p AFOSR-TR-80-0455
Contract F44620-76-C-0041

The electronic structure and properties of semiconductor interfaces including both vacuum-semiconductor and metal-semiconductor interfaces as well as relevant metal and semiconductor materials have been investigated under this contract. The emphasis is on elucidating the electronic properties of these materials and their interfaces, e.g., metal-semiconductor Schottky barriers, which are of far reaching importance in such semiconductor devices as MOSFETS, CCD devices, photovoltaic devices, etc. Extensive studies of the electronic structure of semiconductor surfaces and interfaces and related metal surfaces as a function of surface preparation, doping, thickness of adsorbed overlayer, etc. has been performed.

AD-A085 674/0 PC A04/MF A01
Rensselaer Polytechnic Inst Troy NY Dept of Mechanical Engineering Aeronautical Engineering and Mechanics
A Fully Macroscopic Description of Bounded Semiconductors with an Application to the Si-SiO2 Interface.
Technical rept.,
M. G. Ancona, and H. F. Tiersten. May 80, 52p Rept no. TR-31
Contract N00014-76-C-0368

A fully macroscopic description of semiconductors is presented which includes the boundary conditions at the surface of the semiconductor that are required for consistency with the usual diffusion-drift current equations. As in all field theories, e.g., electromagnetism, both the boundary conditions and the differential equations are obtained from the same governing integral forms. The new boundary conditions relate the jump discontinuities in the chemical potentials across the interface to the forces exerted by the lattice on the charge carries which prevent the carriers form leaving the solid. The expressions for the forces in the static case are found and the values of the material surface coefficients appearing therein are obtained from quasistatic MOS C-V measurements for some particular Si-Si02 interfaces. (Author)

CONF-791112-54 MF A01
Oak Ridge National Lab., TN.
Macroscopic Theory of Pulsed Laser Annealing.
R. F. Wood, J. C. Wang, G. E. Giles, and J. R. Kirkpatrick. Dec 79, 19p
Contract W-7405-ENG-26
Symposium on the scientific basis for nuclear waste management, Boston, MA, USA, 26 Nov 1979.
Microfiche copies only.

Radiation from high-power Q-switched lasers has been used recently in semiconductor research to anneal the lattice damage caused by ion implantation, diffuse surface-deposited dopant films, recrystallize doped amorphous films deposited on substrates, and remove precipitates present after conventional high-temperature dopant diffusion. All of these processes can be understood in terms of models based on macroscopic diffusion equations for heat and mass transport, cast in a finite-difference form to allow for the temperature- and spatial-dependence of the thermal conductivity, absorption coefficient, reflectivity, and other quantities. Results of calculations on silicon with the models show that the near-surface region of a sample can melt and stay molten for times of the order of 100 nsec during which dopant diffusion in the liquid state and nonequilibrium segregation during ultrarapid recrystallization are sufficient to explain the major features of the experimental results. Brief descriptions of the physical and mathematical models and some of the results obtained with them are given, with particular emphasis on segregation effects. (ERA citation 05:020863)

CONF-791112-56 PC A02/MF A01
Oak Ridge National Lab., TN.
Surface Segregation in Laser Annealing of Ion Implanted Silicon.
C. W. White, S. R. Wilson, B. R. Appleton, and J. Narayan. 1979, 6p
Contract W-7405-ENG-26
Symposium on the scientific basis for nuclear waste management, Boston, MA, USA, 26 Nov 1979.

Profiles for Group III and V dopants after pulsed laser annealing are calculated using a model which incorporates dopant diffusion in the liquid and a segregation coefficient from the melt. Values for the interfacial distribution coefficient are much higher than equilibrium values. Non Group (III, V) impurities exhibit segregation which is a function of implantation dose and number of annealing pulses. At high doses, all species which exhibit segregation develop a cell structure in the surface region as a result of constitutional supercooling. We estimate the thermal gradient in the liquid necessary to produce consitutional supercooling. (ERA citation 05:020864)

CONF-791112-59 PC A02/MF A01
Oak Ridge National Lab., TN.
Melting by Pulsed Laser Irradiation.
J. Narayan, and C. W. White. 1979, 5p
Contract W-7405-ENG-26
Symposium on the scientific basis for nuclear waste management, Boston, MA, USA, 26 Nov 1979.

The phenomenon of melting produced by pulsed ruby-laser (lambda = 0.694 mu m) irradiation has been investigated. Removal of dopant precipitates, dislocations, and loops during laser irradiation provides clear evidence of melting. The depth of melting can be determined as a function of laser parameters (energy density and pulse duration) from the thickness of defect-free regions and lengths of reoriented dislocation segments. (ERA citation 05:020865)

DOE/ER/01198-1301 PC A04/MF A01
Illinois Univ. at Urbana-Champaign.
Scattering of Phonons by Dislocations.
A. C. Anderson. 1979, 60p
Contract AC02-76ER01198

By 1950, an explicit effort had been launched to use lattice thermal conductivity measurements in the investigation of defect structures in solids. This technique has been highly successful, especially when combined with the measurements of other properties such as optical absorption. One exception has been the study of dislocations. Although dislocations have a profound effect on the phonon thermal conductivity, the mechanisms of the phonon-dislocation interaction are poorly understood. The most basic questions are still debated in the literature. It therefore is pointless to attempt a quantitative comparison between an extensive accumulation of experimental data on the one hand, and the numerous theoretical models on the other. Instead, this chapter will attempt to glean a few qualitative conclusions from the existing experimental data. These results will then be compared with two general models which incorporate, in a qualitative manner, most of the proposed theories of the phonon-dislocation interaction. Until very recently, measurement of thermal conductivity was the only means available to probe the interaction between phonons and defects at phonon frequencies above the standard ultrasonic range of approx. = 10 exp 9 Hz. The introductory paragraphs provide a brief review of the thermal-conductivity technique and the problems which are encountered in practice. There is also a brief presentation of the theoretical models and the complications that may occur in more realistic situations. (ERA citation 05:023302)

DOE/ER/02314-16 PC A02/MF A01
Dartmouth Coll., Hanover, NH. Dept. of Physics and Astronomy.
Experimental Determination of the Temperature Dependence of Metallic Work Functions at Low Temperatures. Final Report.
P. B. Pipes. Mar 80, 6p
Contract EY-76-S-02-2314

Work involving the use of a modified Kelvin technique to study the temperature dependence of the work function of both bare metallic surfaces and metallic surfaces with exp 4 He gas adsorbed onto them is described. (ERA citation 05:022667)

DOE/ER/10461-1 PC A02/MF A01
Minnesota Univ., Minneapolis. School of Physics and Astronomy.
Far Infrared and Thermal Studies on Low Temperature Materials. Progress Report, July ', 1979-March 15, 1980.
C. Huang. 15 Mar 80, 3p
Contract AC02-79ER10461

Major progress in setting up the facility for the modulation far infrared spectroscopy as well as experimental results in thermal studies of V sub 3 Si crystalline samples are described. (ERA citation 05:021452)

IAE-3065 MF A01
Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Moscow. Inst. Atomnoi Energii.
Fast Ion Implantation Into Monocrystals.
V. V. Titov. 1978, 35p
In Russian.
U.S. Sales Only. Microfiche copies only.

The results of physical experiments on ion implantation are generalized. The theory of ion movement in the isotropic medium and its application to semiconductors in more details is considered. The examples of calculations of ranges and profiles of distributions of implanted particles in different semiconductors are presented. Various aspects of the ion channeling effect in monocrystals are considered. Analytical expression for the critical chan-

neling angle, channeling probability and dechanneling are discussed. The processes of particle deacceleration in the channel are considered. Various analytical expressions of elastic and inelastic energy losses in case of channeling are discussed. Analytical calculations of profiles of implantated atoms without regard for some important factors such as, for example, radiation-stimulated diffusion are analyzed. (Atomindex citation 11:495564)

N80-25391/7 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
The Impurity Resitivity of In Doped CDS.
A. F. Dasilva. Feb 80, 14p INPE-1685-RPE/116-REV
Revised. Submitted for Publication.

The previously developed theory of Matsubara-Toyozawa for impurity bands in doped semiconducotrs was investigated by including the effect of correlation via an alternant-molecular-orbital method in order to calculate the impurity resistivity of CdS:In. Specific results are reported.

N80-26178/7 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A Calculation of the Pressure Dependent Energy Bands of CuCl.
P. S. Guimaraes, and N. D. J. Parada. Jan 80, 19p INPE-1674-RPE/109
Revised.

The calculation of the energy bands of CuCl by the cluster method is presented. Several clusters were used, all giving the same results. The calculated energy bands coincide with the known experimental facts on CuCl. The calculated bands present a sudden change at 40 kbar, very suggestive of the transition that CuCl undergoes at such pressures.

N80-26179/5 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
Radiative and Nonradiative Recombination Times in Semiconducting Films.
M. T. Pacheco. Feb 80, 24p INPE-1679-RPE/112
Revised. Submitted for Publication.

The dependence of the fluorescence lifetime upon the thickness of active thin films is discussed. For systems in which the radiative recombination rate is dominant over the nonradiative ones, the total recombination time can be changed by suitable modifications of the film thickness. In this situation the nonradiative rate can be evaluated. Experimental results for the case of cadmium sulfide thin films are presented.

PAT-APPL-6-008 622 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Method of Manufacturing a Niobium-Aluminum-Germanium Superconductive Material.
Patent Application,
J. L. F. Wang, M. R. Pickus, and K. E. Douglas.
Filed 1 Feb 79, 10p
Contract W-7405-ENG-48
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A method for manufacturing flexible Nb sub 3 (Al,Ge) multifilamentary superconductive material in which a sintered porous Nb compact is infiltrated with an Al-Ge alloy. It is deformed and heat treated in a series of steps at successively higher temperatures preferably below 1000 exp 0 C during the heat treatment, cladding material such as copper can be applied to facilitate a deformation step preceding the heat treatment and can remain in place through the heat treatment to serve as a temperature stabilizer for the superconductive material produced. These lower heat treatment temperatures favor formation of filaments with reduced grain size and with more grain boundaries which in turn increase the current-carrying capacity of the superconductive material. (ERA citation 05:024362)

PATENT-4 201 622
Not available NTIS
National Aeronautics and Space Administration. Pasadena Office, CA.
Method of Mitigating Titanium Impurities Effects in p-Type Silicon Material for Solar Cells.
Patent,
A. M. Salama. Filed 31 Jan 79, patented 6 May 80, 7p N80-24741/4, PAT-APPL-6-008 212
Supersedes PAT-APPL-6-008 212, N79-17315 (17 - 08, p 1001). Sponsored by NASA.
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC. 20231 $0.50.

An economical way to reduce the deleterious effects of titanium, one of the impurities present in metallurgical grade silicon material, is disclosed. By adding copper to approximately the same concentration level of the titanium during the melting process, the conversion efficiency will be restored to about 99.3% of what it would have been if the single crystal silicon had been grown free of titanium impurities.

PB80-194129 PC **A10**/MF **A01**
Department of Energy, Washington, DC.
Ukrainian Physics Journal,
V. E. Lashkarev. c1980, 203p TT-74-52000/04
Trans. of Ukrainskii Fizicheskii Zhurnal (USSR) v17 n4 Apr 72, by E. V. Kathavate. See also Volume 17, Number 3, PB80-101934. Sponsored in part by National Science Foundation, Washington, DC. Special Foreign Currency Science Information Program.

Partial contents: Investigation of reflecting electrooptical light deflectors from KDR-type crystals; The theory of nonradiative proton transitions in the hydrogen bond of nucleic acids; Electronic structure of the superconducting Nb-Ti system; Roentgen- and thermoluminescence in crystals of yttrium-aluminum garnet with chromium impurity; Electrical- and photoconductivity of p-type CdP2 single crystals.

20M. Thermodynamics

AD-A084 990/1 PC **A03**/MF **A01**
Naval Research Lab Washington DC
An Assessment of Physics Research Opportunities Available from Rapid Heating and Cooling.
Memorandum rept.,
James S. Murday. 7 Apr 80, 30p NRL-MR-4211, AD-E000 417

Rapid heating and cooling (i.e. rates of temperature change greater than one million degrees K/sec) have become a major new approach to materials processing in the metallurgy and electronics communities; rates up to 10 to the 14th power degrees K/sec have been reported in the literature. This report assesses where the capability for rapid energy transfer into a condensed phase, developed as part of materials processing research, might also be utilized to give new insights into physical properties or to explore new concepts in physics. The unique aspect of the rapid heating/cooling technology is the short time frame, 10 to the minus 8th power - 10 to the minus 12th power sec used to transfer the energy. Electron and laser beams are the most likely heating sources since they can generate short, intense, controlled pulses; rapid cooling must depend on conductive heat flow and is thereby restricted to thin film configurations. The perceived physics research opportunities are organized about four categories: mass transport, energy transport, theoretical concepts and dynamic measurement capability. The section on mass transport examines issues in nucleation, solidification , segregation, melting and metastable structure. The section on energy transport examines issues in beam-matter interactions, thermalization processes, interfacial energy transfer, thermoelectric effects, and thermoacoustic coupling. (Author)

AD-A085 336/6 PC **A02**/MF **A01**
Kansas Univ Lawrence Dept of Mathematics
The Heat Equation, the KAC Formula and Some Index Formulas,
T. E. Duncan. 15 Oct 79, 22p AFOSR-TR-80-0345
Grants AFOSR-77-3177, NSF-ENG75-06562
Pub. in Partial Differential Equations and Geometry, Lecture Notes in Pure and Applied Mathematics, v48 p57-76 1979. Sponsored in part by Grant NSF-MCS76-01695.

No abstract available.

AD-A085 563/5 PC **A02**/MF **A01**
California Univ Berkeley Dept of Mechanical Engineering
On the Role of the Second Law of Thermodynamics in Mechanics of Materials.
Technical rept.,
P. M. Naghdi. Oct 79, 15p Rept no. UCB/AM-79-3
Contract N00014-75-C-0148

This paper summarizes the recent work of Green and Naghdi concerning the thermomechanics of dissipative materials, the main features of which are: (a) The introduction of a conservation law for entropy which holds for all materials, (b) the use of the energy equation as an identity for all processes, thereby leading to restrictions on constitutive equations, and (c) the development of an inequality representing a mathematical interpretation of a statement of the second law of thermodynamics. (Author)

AD-A085 767/2 PC **A06**/MF **A01**
California Univ Los Angeles Dept of Physics
A Study of Persistent Currents in Superfluid 4He.
Doctoral thesis,
Roset Khosropour Talaghany. Mar 80, 121p Rept no. TR-40
Contract N00014-75-C-0246

Decay of saturated persistent currents in superleaks in contact with bulk superfluid helium has been studied using doppler shifts of the acoustic modes of an annular resonator partially packed with superleak. The two acoustic modes are an interpolated first-fourth sound and a modified second sound. Decay of such currents have been measured at 1.35 degrees K for annuli 10, 20, 40, 60, 80, 90, 95 and 100 percent filled with superleak. The main result which is somewhat surprising, is that the saturated persistent current and its fractional decay rate varies only slightly with superleak depth and the average decay rate is about 2.5% per decade. Another phenomena which was also studied is the doppler shift of gravity waves in a partially packed powder. The velocity of gravity waves is about three orders of magnitude smaller than the fourth sound velocity in a similar geometry. Thus it seemed appropriate to use its doppler shift for measuring small persistent currents. A theoretical study of the problem showed that the gravity waves are not doppler shifted in the presence of a persistent current in superleak, however the waves are still doppler shifted by the persistent currents in the free region. Experiments support the theoretical prediction, and also indicate the existence of a small current of about 8 millimeters per second in the free region. (Author)

UCID-17980(Rev.1) PC **A05**/MF **A01**
California Univ., Livermore. Lawrence Livermore Lab.
TACO: A Finite Element Heat Transfer Code.
W. E. Mason, Jr. Feb 80, 80p
Contract W-7405-ENG-48

TACO is a two-dimensional implicit finite element code for heat transfer analysis. It can perform both linear and nonlinear analyses and can be used to solve either transient or steady state problems. Either plane or axisymmetric geometries can be analyzed. TACO has the capability to handle time or temperature dependent material properties and materials may be either isotropic or orthotropic. A variety of time and temperature dependent loadings and boundary conditions are available including temperature, flux, convection, and radiation boundary conditions and internal heat generation. Additionally, TACO has some specialized features such as internal surface conditions (e.g., contact resistance), bulk nodes, enclosure radiation with view factor calculations, and chemical reactive kinetics. A user subprogram feature allows for any type of functional representation of any independent variable. A bandwidth and profile minimization option is also available in the code. Graphical representation of data generated by TACO is provided by a companion post-processor named POSTACO. The theory on which TACO is based is outlined, the capabilities of the code are explained, the input data required to perform an analysis with TACO are described. Some simple examples are provided to illustrate the use of the code. (ERA citation 05:021037)

20N. Wave Propagation

AD-A084 939/8 PC **A04**/MF **A01**
Utah Univ Salt Lake City Dept of Mathematics
Rayleigh-Bloch Wave Expansions for Diffraction Gratings I.
Technical summary rept.,
Calvin H. Wilcox. Mar 80, 74p Rept no. TR-37
Contract N00014-76-C-0276

Plane diffraction gratings with period 2 pi lying in a strip 0 < y < h in the x,y-plane are studied. A Rayleigh Bloch (R-B) wave for a grating is the response Psi sub + (x,y,p,q) to a plane wave 1/2 pi exp(i(px-qy)) incident from y > h (p eta R, q > 0). The paper presents a construction of R-B waves and a proof that (psi sub + (x,y,p,q)/p eta R, q > 0) is a complete orthogonal family in L(2)(G) in the sense of the Plancherel theory.

AD-A085 208/7 PC **A02**/MF **A01**
California Univ San Deigo La Jolla Dept of Electrical Engineering and Computer Sciences
A Simplified Theory of ELF Propagation in Its Earth-Ionosphere Transmission Line and Its Worldwide Application. Supplement,
Henry G. Booker. 1980, 14p
Contract N00014-78-C-0682
Supplement to report dated 31 Mar 80, AD-A083 097.

The NOSC computer program has confirmed that non-reciprocity in the ELF band is not introduced in the refracting stratum near the bottom of the ionosphere. It is introduced higher up where the direction of phase propagation is almost vertical. It has been determined that the effect of a slightly off-vertical angle for the direction of phase propagation in the ionosphere in the ELF band does in fact cause the non-reciprocity obtained by Pappert and Moler (1974). The electromagnetic reason for this has been identified and is described below. The fact that off-vertical angles of less than a degree for the direction of phase propagation have noticeable effects raises the question of how precisely the stratification of the ionosphere may be assumed to be horizontal.

AD-A085 332/5 PC **A02**/MF **A01**
Massachusetts Univ Amherst Dept of Electrical and Computer Engineering
Analysis of HF Pulse Reflection from a Randomly Varying Ionosphere,
Alfonso Malaga, and Robert E. McIntosh. 7 Jul 77, 11p AFOSR-TR-80-0359
Grant AFOSR-75-2763
Pub. in IEEE Transactions on Antennas and Propagation, vAP-27 n4 p508-516 Jul 79.

No abstract available.

AD-A085 448/9 PC **A04**/MF **A01**
Illinois Univ At Urbana-Champaign Dept of Electrical Engineering
Studies of Transionospheric Scintillation Using Orbiting Satellite Data.
Scientific rept. no. 2, Jul 79-Jul 80,
Stanley Brittain Quinn, Jr. Apr 80, 73p UILU-ENG-80-2539, TR-66, AFGL-TR-80-0092
Contract F19628-78-C-0195

Multi-frequency studies of transionospheric radio signals fluctuations are facilitated by the DNA Wideband Satellite Experiment run by SRI International. Mutually coherent signals were recorded at equatorial, mid-latitude and auroral stations. Results including statistical parameters of the received signals as well as what they reveal about the ionosphere are discussed. Correlations and power spectra of the signals are also computed. (Author)

AD-A085 583/3 PC **A03**/MF **A01**
Science Applications Inc La Jolla CA
The Behavior of Thin Dielectrics Under Electron Irradiation.
Final rept.,
B. Goplen, W. R. Thomas, W. A. Seidler, and A. Greenwald. Mar 80, 47p AFWL-TR-78-240, AD-E200 476
Contract F29601-77-C-0021

An experimental and analytical investigation has been made of the anomalous behavior of an electron beam in the presence of dielectrics. The configuration considered is an internal cavity, with electron beam anode on one end and a Faraday cup on the other. Experiments were performed for an empty cavity (vacuum case) and also with a thin dielectric sheet immediately adjacent to the cylinder wall. Variations include the type of dielectric and the use of a screen at the vacuum-dielectric interface. The experimental evidence is that, while transmitted current is very low for the empty cavity, the presence of dielectric causes considerable enhancement in transmission. This experiment was modelled analytically using MAD2, a 2-D SGEMP code, to determine the cause of this behavior. Low transmission for the vacuum case is shown due initially to beam spreading (coulomb repulsion) and at later stages to extreme space-charge limiting. It is also demonstrated that enhancement is not due to the electromagnetic effect of dielectric charging. Rather, creation of a plasma at the dielectric surface is hypothesized as the probable effect, with plasma electrons providing breakdown of the space-charge barrier, and positive ions providing charge neutralization and pinching of the beam. Detailed calculations using a simple plasma model give good agreement with experimental data. However, no physical mechanism for the plasma creation process is suggested.

AD-A085 760/7 PC **A07**/MF **A01**
SRI International Menlo Park CA
DICE THROW/UHF/SHF Transmission Experiment. Volume III. Final Data Reduction and Interpretation.
Topical rept. 16 Nov 76-19 Mar 79,
Alan A. Burns, and Patricia L. Crawley. 1 Aug 79, 142p DNA-4216T-3, AD-E300 800
Contract DNA001-75-C-0206
See also Volume 1, AD-C013 482.

This report presents the final results from an rf propagation experiment fielded during the DICE THROW HE test held at the White Sands Missile Range on 6 October 1976. That experiment was designed to measure the effects of high-density, explosively produced dust clouds on a series of coherent signals ranging in frequency from 400 MHz to 10 GHz. Both amplitude and phase data were obtained. This report contains: (1) A description of the experiment; (2) The reduced rf data; (3) An interpretation of the results; (4) A discussion of theoretical effects of dust and crater debris on rf signal propagation; and (5) Results from photographic coverage of the event, including comparisons with hydrodynamic-code flow-field predictions and with nuclear and other non-nuclear tests. The observed rf results were found to be consistent with the behavior expected from theoretical considerations and dust densities obtained from a simple model based on material missing from the water and measured cloud volume. Because of the relatively small volume of space affected, rf effects were generally mild, unless a threshold combination of the dust density and the particle size distribution parameter were exceeded. Once the threshold was crossed, extinction coefficients rose to as much as several tens of decibels per kilometer. This was accompanied by the complete loss of a coherent signal component, strong fading, and the apparent onset of multiple scattering.

N80-25588/8 PC **A99**/MF **A01**
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
Proceedings of the AERO-Optics Symposium on Electromagnetic Wave Propagation from Aircraft.
Apr 80, 666p NASA-CP-2121, A-8090
Sponsored in Part by AFWL. Symp. Held at Moffett Field, Calif., 14-15 Aug. 1979.

No abstract available.

21. PROPULSION AND FUELS

21B. Combustion and Ignition

AD-A085 463/8 PC **A02**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
Technical Evaluation Report on the Propulsion and Energetics Panel 54th (B) Meeting on Combustor Modelling.
Advisory rept.,
David Dryburgh, and Raymond B. Edelman. Mar 80, 21p Rept no. AGARD-AR-153
See also Rept. no. AGARD-cp-275.

The task of this report is to evaluate the AGARD Propulsion and Energetics Panel 54th (B) Specialists' Meeting on Combustor Modelling, which was held at DFVLR, Cologne, Germany, from 3 to 5 October 1979. After a short introduction, the meeting papers are classified into a lot of categories concerning model elements, dimensionality, survey type, application and theoretical development. The first evaluation follows this classification, while other evaluations are related to the manufacturer's and the researcher's point of view. The report is finalized with conclusions and recommendations for future treatment of combustor modelling. The full papers of the Proceedings are published as AGARD Conference Proceedings No. 275. This Advisory Report was prepared at the request of the Propulsion and Energetics Panel of AGARD. (Author)

AD-A085 722/7 PC **A04**/MF **A01**
Army Armament Research and Development Command Aberdeen Proving Ground MD Ballistics Research Lab
The Detailed Modeling of Premixed, Laminar Steady-State Flames to Obtain Validated Reaction Networks. I. Ozone.
Technical rept.,
Joseph M. Heimerl, and Terence P. Coffee. Apr 80, 51p ARBRL-TR-02239, AD-E430 448

We have employed species dependent input coefficients for the test case ozone in a one-dimensional model of a premixed, laminar steady-state flame. Convenient expressions for the input coefficients are developed. These coefficients are based on independent measurements, i.e., no arbitrary parameters are used in this model. The governing equations are solved using a relaxation technique and the partial differential equation package, PDECOL, developed by Madsen and Sincovec. Species and temperature profiles and the burning velocities are found over the range of initial ozone mole fraction of 0.25 to 1.00. The computed burning velocities are no more than 30% greater than the measurements of Streng and Grosse. Comparison with the computed results of Warnatz shows agreement within plus or minus 12%, even though he used quite different expressions for some of the kinetic coefficients. These differences are manifest in the atomic oxygen and temperature profiles at an initial ozone mole fraction of unity. A comparison of the model profiles indicates a need for measurements of ab initio calculations for the rate coefficient for the reaction 03 + 0 yields 2 O2 at temperatures in the range 1500-2000K.

FE-2700-7 PC **A02**/MF **A01**
Houston Univ., TX.
Heat Transfer in a Fluidized Counter Current Bed. Quarterly Report, February-May 1979.
R. Jackson. Jun 79, 16p
Contract EF-77-S-01-2700

An apparatus has been designed and constructed to investigate the downfall of larger and/or denser particles through a fluidized bed of smaller and/or less denser particles. The investigation of the influence of bed expansion, feed rate of the descending particles and descending particle size and density on the holdup of the descending particles in a 4 in. diameter bed has been continued to cover a wider range of descending particle densities. Measurements of heat transfer rates from the descending particles to the bed, have been completed for the following systems, lead shot-polystyrene and steel shot-polystyrene. (ERA citation 05:022823)

FE-3167-T8 PC **A03**/MF **A01**
United Technologies Research Center, East Hartford, CT.
Investigation of the Devolatilization of Coal under Combustion Conditions. Fifth Quarterly Report, 1 October 1979-31 December 1979.
P. R. Solomon. 1980, 33p
Contract ET-78-C-01-3167

This report describes progress on the study of pyrolysis of coal under combustion conditions. Major accomplishments have been the successful test-

ng of the new furnace reactor, the characterization of two additional desulfurized coals, initial measurements of oxygen forms in coal with the scanning electron microprobe and application of FTIR techniques to the characterization of oil shales. The work on the new reactor has verified that useful in-situ measurements of infrared gas spectra can be made at temperatures up to 1200 exp 0 K using the FTIR. (ERA citation 05:021725)

21D. Fuels

AD-A084 960/4 PC **A04**/MF **A01**
Crew Systems Consultants Yellow Springs OH
Flight Test Results of the Use of Ethylene Glycol Monomethyl Ether (EGME) as an Anti-Carburetor Icing Fuel Additive.
Final rept.,
Richard L. Newman. Jul 79, 67p TR-79-9, FAA-AWS-79-1
Contract DOT-FA78WA-4165

Flight test results of Ethylene Glycol Monomethyl Ether (EGME) show that EGME reduces the formation of carburetor ice during cruise power, and that the effectiveness of EGME reduces as the throttle is closed. Based on these results, EGME should not be considered as an anti-carburetor icing fuel additive in lieu of carburetor heat.

BMI-2043 PC **A02**/MF **A01**
Battelle Columbus Labs., OH.
Thermophysical Properties of Coal Liquids. First Quarterly Technical Status Report, October 1-December 31, 1979.
J. W. Droege, and S. P. Chauhan. 21 Jan 80, 8p
Contract AC01-79ET14941

The purpose of the program is to determine certain physical properties of coal-solvent slurries as these slurries undergo dissolution reactions. The properties are viscosity, thermal conductivity, density, heat of reaction, and specific heat. The first task, development of an experimental plan, has been completed. Some of the needed equipment has been placed on order. Exploratory viscosity measurements have been made, showing the need for several modifications and disclosing the nature of the stirring difficulties to be anticipated. (ERA citation 05:021655)

CONF-800223-4 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Synchronous Fluorescence and Phosphorescence at Room Temperature for Levels 1 and 2 Organic Analysis.
R. B. Gammage, T. Vo-Dinh, and P. R. Martinez. 1980, 19p
Contract W-7405-ENG-26
Symposium on process measurements for environmental assessment, Atlanta, GA, USA, 25 Feb 1980.

By simple and rapid synchronous luminescence techniques, analysis was carried out on thirteen polynuclear aromatic components in a liquid chromatography fractionated XAD-2 extract from Source Assessment Sampling System runs. This same sample was used in an interlaboratory evaluation of current Environmental Protection Agency Level 1 organic analysis procedures. Comparative results show that synchronous fluorescence and room temperature phosphorescence provide data that are more than adequate for Level 1. These techniques should also be seriously considered in the development of Level 2 organic analysis procedures. An example is given of the use of luminescence for rapid screening of an unfractionated coal liquefaction product for a major PNA component. (ERA citation 05:022742)

CONF-800433-1 PC **A02**/MF **A01**
Oak Ridge National Lab., TN.
Nuclear Methods in Coal Research.
W. S. Lyon. 1980, 9p
Contract W-7405-ENG-26
International conference on nuclear methods in environment and energy research, Columbia, MO, USA, 14 Apr 1980.

Nuclear methods, particularly neutron activation analysis (NAA) provide useful information about elemental constituents in coal and fly ash, but often other techniques are required to supplement NAA data. Spark source mass spectrometry and atomic absorption have been studied as methods for determination of certain elements in coal that are not easily measured by NAA. In work concerned with the chemical speciation of elements in fly ash, a number of analytical techniques have been used; these include NAA, chemical etching and separation, optical and electron microscopy and x-ray diffraction. (ERA citation 05:020944)

DOE/ET/12099-1 PC **A05**/MF **A01**
Idaho Univ., Moscow. Dept. of Chemical Engineering.
Oxidation/Gasification of Retorted Oil Shale. Final Report, (Anvil Points Shale).
W. J. Thomson. Oct 79, 95p
Contract AS07-77ET12099

Reaction rate kinetics were determined for the oxidation and gasification of oil shale char produced by retorting oil shale from the Anvil Points area of Colorado. Variables investigated included the effect of retorting rate (.3 to 17 exp 0 C/min) on the char quantity and quality as well as a range of concentrations and temperatures pertinent to char gasification. As long as the shale was retorted at rates higher than 0.3 exp 0 C/min or with purge velocities higher than 4 cm/min (STP), there was no effect of retorting on the char make. Neither did the assay of the shale (15 to 50 GPT) have any effect on the char oxidation activity. Char oxidation was first order with respect to both char and oxygen and had an activation energy of 23.2 kcal/mole, for shale which were either acid leached or had not undergone mineral decomposition. On the other hand, the CaO produced by calcite decomposition increased char oxidation by about one order of magnitude. Oxygen mass transfer measurements with the larger shale pieces pointed to the importance of convective mass transport during the oxidation of the first 40% of the char. Limited studies of the mineral reactions indicated that calcite was easily reformed from CaO, particularly when CO sub 2 was liberated at the surface from char oxidation. The LLL silication rate expression provided a good match to the experimental data. The data on the effect of H sub 2 O on mineral decomposition are in agreement with LLL results. Analysis of the decomposition data during dolomite decomposition point to the possibility that CO sub 2 may inhibit the decomposition rate as well as prevent steam enhancement. A rate expression derived to describe CO sub 2 -char gasification accounts for low apparent CO sub 2 reaction orders at high partial pressures. It was necessary to consider the role of the water gas shift reaction during steam gasification of the char. (ERA citation 05:021811)

DOE/PC/30014-1 PC **A02**/MF **A01**
Pittsburgh Univ., PA.
Hydrogen Distribution and Transfer in Coal Hydrogenation Systems. Quarterly Report, December 1979-February 1980.
S. H. Chiang, and G. E. Klinzing. Mar 80, 9p
Contract AC22-80PC30014

The proposed research program is aimed at developing an in-situ H sub 2 probe and providing experimental data of equilibrium distribution and rate of transfer of hydrogen in coal hydrogenation systems. The study is a continuation of an on-going research project to achieve the following specific goals: (1) To develop a thin nickel-membrane probe for in-situ hydrogen measurement; (2) To obtain equilibrium solubility data for hydrogen in coal liquids; (3) To study dynamic behavior and rate of hydrogen transfer in coal liquids and to examine the rate limiting steps of the process; (4) To study the physical/chemical effect due to the addition of coal on the equilibrium distribution of hydrogen in coal liquids; (5) To determine the rate of transfer of hydrogen between the gas phase and the condensed phase (which contains coal liquids and dissolved coal). (ERA citation 05:021584)

FE-2013-10 PC **A02**/MF **A01**
State Univ. of New York at Buffalo.
Catalytic Coal Liquefaction. Quarterly Report, June-September, 1979.
S. W. Weller. 1979, 14p
Contract EX-76-C-01-2013

Hydrogen transfer at 400 exp 0 C from tetralin to a West Virginia coal can be catalyzed by either Co/Mo/Al sub 2 O sub 3 or by SnCl sub 2 , for catalyst loadings of either 1% or 10% based on coal. For a given catalyst loading, stannous chloride is the more effective catalyst. Catalytic hydrotreating of 1-methylnaphthalene, a component of most recycle vehicles in coal liquefaction processes, can provide a useful screening test for three catalytic functions: ring hydrogenation, hydrodemethylation (HDM), and ring hydrocracking to give substituted benzenes. Detailed information is obtained from the pressure change on reaction and from gas chromatographic analyses of both the product gas and the product liquid. A commercial Co/Mo/Al sub 2 O sub 3 catalyst tested at 450 exp 0 C shows very little incremental HDM compared with a no-catalyst control, no ring hydrocracking, but substantial ring hydrogenation. At 500 exp 0 C, all reactions are more extensive. A low-temperature ash from Kentucky coal is relatively inactive at 450 exp 0 C except for HDM. An experimental design has been worked out for testing particulate Co/Mo/Al sub 2 O sub 3 catalysts. Determination of the specific surface area of molybdena in a pre-reduced catalyst by low-temperature chemisorption of O sub 2 is being tested in a dynamic system as well as in a conventional static system. (ERA citation 05:021634)

FE-2018-13 PC **A02**/MF **A01**
Western Michigan Univ., Kalamazoo.
Fundamentals of Nitric Oxide Formation in Fossil Fuel Combustion. Progress Report, 29 Mar-28 June 1979.
T. Houser. Apr 80, 21p
Contract EX-76-C-01-2018

In order to determine the catalytic agent(s) responsible for the autocatalysis during the inert pyrolysis of pyridine, all of the identified volatile pyrolysis products were added to the reaction. It was found that only acetylene produced a significant increase in rate. However, the data obtained during these experiments indicated that the entire pyrolysis results should be reexamined using the mass spectrometer rather than the chromatograph. This was done over the entire temperature range and the rate equation and constants were reevaluated. Mechanistic implications of the new data are discussed. (ERA citation 05:021647)

FE-2028-17 PC **A04**/MF **A01**
Delaware Univ., Newark.
Kinetics and Mechanism of Desulfurization and Denitrogenation of Coal-Derived Liquids. Fourteenth Quarterly Report, September 21, 1978-December 20, 1978.
B. C. Gates, J. R. Katzer, J. H. Olson, H. Kwart, and A. B. Stiles. 16 Mar 79, 67p
Contract EX-76-C-01-2028

Quantitative measurement of the reactivities of methyl-substituted dibenzothiophenes, under high pressure reaction conditions (102 atm, 300 exp 0 C) representative of industrial practice, has been accomplished. The catalyst was sulfided commercial Co-Mo/ gamma -Al sub 2 O sub 3 . Methyl groups in the 2 and 8 or 3 and 7 positions show little effect. Methyl groups in the 4 position, however, reduced the reactivity by an order of magnitude and methyl groups in the 4 and 6 positions reduced it somewhat more. Dibenzothiophene (DBT) was found to be self-inhibiting and results with the methyl-substituted compounds implies that there is competitive adsorption of DBT and the methyl-substituted DBT. The reaction network involving benzonaphthothiophene and hydrogen has been determined. As before, the catalyst was typical commercial cobalt molybdate (sulfided CoO-MoO sub 3 / gamma -Al sub 2 O sub 3). The reaction conditions were 68 atm and 300 exp 0 C. The important result was that in contrast to dibenzothiophene, benzonaphthothiophene experiences extensive hydrogenation accompanying hydrodesulfurization, even with Co-Mo/ gamma -Al sub 2 O sub 3 , the most selective of the available hydrodesulfurization catalysts. The sulfur-containing compounds having 3 rings or fewer experience nearly stoichiometric hydrodesulfurization (hydrogenolysis without hydrogenation), whereas the sulfur-containing compounds having 4 rings or more experience hydrogenation and hydrodesulfurization at roughly equal rates, giving products which experience further hydrogenation (and/or hydrodesulfurization - as the compound allows), again at roughly the same rates. (ERA citation 05:021575)

FE-2696-T5 PC **A02**/MF **A01**
Virginia Polytechnic Inst. and State Univ., Blacksburg.
Development and Application of Analytical Techniques to Chemistry of Donor Solvent Liquefaction. Quarterly Progress Report, June 1979-December 1979.
A. M. Squires, H. C. Dorn, L. T. Taylor, J. G. Dillard, and P. R. Rony. Mar 80, 25p
Contract EF-77G-01-2696

It is clear from the limited results in this report that flow LC-NMR is a viable approach for rapid analysis of complex mixtures encountered in petroleum, shale, and coal products. Some of the initial results and implications of this feasibility study are summarized below: (1) The time savings gained by the flow LC-NMR approach is enormous when compared with normal chromatographic procedures of fraction collection solvent evaporation and preparation for spectroscopic examination. (2) The present results indicate limits of detection which require semi-preparative chromatographic loads. State-of-the-art NMR instrumentation should extend this approach to truly analytical columns for HNMR. We are continuing this development at the present time. (3) The flow LC-NMR approach has been extended to exp 19 F NMR. This complements the fluorine tagging work which is also a major part of the present contract. An additional advantage is the wider scope of chromatographic solvents which can be utilized. (4) Although the present study focused on relatively nonpolar solvent systems, this approach can be extended to more polar solents which would allow ready examination of more polar constituents in coal products. (5) The flow LC-NMR approach is compatible with the other on-line LC detection techniques being developed at VPI (e.g., FT-IR, ICP, etc.). (ERA citation 05:021658)

FE-2702-6 PC **A02**/MF **A01**
Worcester Polytechnic Inst., MA.
Kinetics and Mechanisms of Catalytic Hydroliquefaction and Hydrogasification of Lignite. Quarterly Report, January-March 1979.
A. H. Weiss, and W. L. Kranich. 1979, 5p
Contract EF-77-S-01-2702

A study of the variation of apparent viscosity of lignite-oil slurries showed that a 30% lignite slurry is about the upper limit for practical handling. Lignite is more easily suspended in paraffin oil than in 2 methylnaphthalene in which it settles on standing, forming a dense pasty layer. In both batch and continuous runs, treatment of carrier oils with hydrogen at 1500 psig and 450 to 500 exp 0 C resulted in evolution of considerable methane. Mechanical problems continue to plague the continuous reactor system. (ERA citation 05:021585)

FE-2702-9 PC **A02**/MF **A01**
Worcester Polytechnic Inst., MA.
Kinetics and Mechanisms of Catalytic Hydroliquefaction and Hydrogasification of Lignite. Quarterly Report, October-December 1979.
A. H. Weiss, W. L. Kranich, and K. Gueruez. 1980, 16p
Contract EF-77-S-01-2702

Apparatus for studying continuous catalytic hydroliquefaction and hydrogasification of lignite is now functioning satisfactorily with the exception of the slurry pump. Feed rate limitations imposed by the present pump are expected to be eliminated shortly when a new pump is received. Preliminary data indicate that analytical procedures are yielding information of the quality needed to accomplish the tasks of this project. Results to date suggest that the primary dissolution of lignite is largely uncatalyzed, but that catalytic hydrogenation is important in subsequent production of oils. The mechanism proposed by Cronauer et al for uncatalyzed liquefaction of coal appears to be applicable to the catalyzed conversion of lignite. (ERA citation 05:021586)

FE-2710-7 PC **A03**/MF **A01**
Pennsylvania State Univ., University Park. Dept. of Chemistry.
Instrumental Analysis of Sulfur Compounds in Coal Process Streams. Quarterly Technical Progress Report, April-June 1979.
J. Jordan. Jul 79, 26p
Contract EF-77-S-01-2710

Sulfate and thiosulfate yielded well-defined differential pulse polarograms at the dropping mercury electrode, corresponding to the anodic depolarization process: Hg + 2SO sub 32- = Hg(SO sub 32-) sub 2 + 2e, and Hg + 2S sub 2 O sub 32- = Hg(S sub 2 O sub 32-) sub 2 + 2e. Differential pulse voltammetry of benzothiophene at a rotated glassy carbon disk anode yielded peak signals which were proportional to concentration in a range between 4 x 10 exp -5 M and 2 x 10 exp -3 M. Injection of bisulfide samples into an excess of the reagent hydroxymercury benzoate produced temperature increments which provided a linear measure of HS exp - concentration in a range between 50 and 5000 ppM. The feasibility of the determination of SO sub 2 by differential pulse voltammetry at a rotated glassy carbon cathode has been demonstrated in Synthane by-product waste water samples. Interfering sulfides were successfully removed by prior precipitation as CdS. Tridimensional Pourbaix Diagrams have been applied to predict mole fractions of the sulfur moieties H sub 2 S, HS exp - , S exp 2- , SO sub 2 , HSO sub 3- , SO sub 32- , HSO sub 4- and SO sub 42- in four process stream samples. The hypothetical assignments were drastically at variance with the experimentally measured concentration ratios, indicating that thermodynamic equilibrium was not attained in the process streams. (ERA citation 05:021610)

IS-4718 PC **A04**/MF **A01**
Ames Lab., IA.
Office of Health and Environmental Research. Quarterly Report, April 1, 1979-June 30, 1979.
V. A. Fassel. Oct 79, 75p
Contract W-7405-ENG-82

Progress in the following areas of research reported: characterization of organic pollutants emitted by fossil fuel processing and energy generating plants; environmental effects of using municipal solid wastes as a supplementary fuel; microbiological air quality at the Ames Municipal Solid Waste Recovery System; solid waste to methane environmental study; x-ray and ultraviolet excited optical luminescence (SEOL, UVEOL) of carcinogens - analytical possibilities; laser pumped luminescence (LPL) spectroscopy; and multielement characterization of air particulates. New laser-based methods for the determination of organic pollutants via fluorescence are discussed. (ERA citation 05:022912)

N80-25456/8 PC **A07**/MF **A01**
New Zealand Energy Research and Development Committee, Auckland.
Potential of Energy Farming for Transport Fuels in New Zealand.
G. S. Harris, M. L. Leamy, T. Fraser, J. B. Dent, and W. A. N. Brown. 1979, 135p NZERDC-46

Farming for production of fuel in New Zealand is discussed. The technical and economic aspects of energy farming and guidelines for development of this energy source are presented. Costs and energy ratios are given and areas of concern are highlighted. The results of studies on sugar beets, fodder beets, maize, lucerne, and radiata pine are discussed. The production of methanol, methane, and ethanol by fermentation and gasification are described. Environmental issues are also discussed.

N80-25457/6 PC **A07**/MF **A01**
New Zealand Energy Research and Development Committee, Auckland.
Potential of Energy Farming for Transport Fuels in New Zealand, Appendices.
G. S. Harris, M. L. Leamy, T. Fraser, J. B. Dent, and W. A. N. Brown. 1979, 135p NZERDC-46-APP

Farming for production of fuel in New Zealand is discussed. Subjects studied in this report are: the suitability and distribution of land for the production of biomass, forestry, agricultural crops, maize grain production in the Waikato; processing routes for transport fuels; advisory panel research in the Waikato; scenarios for transport fuels to 2000; toxicity and other potential danger considerations associated with distribution and opportunity costs.

ORNL/TM-7197 PC **A03**/MF **A01**
Oak Ridge National Lab., TN.
Regional Development Implications of Alternative Future Coal Production Patterns.
D. J. Bjornstad. Apr 80, 37p
Contract W-7405-ENG-26

The manner in which BEA functional economic areas may respond to alternative levels of exogenous local economic stimuli is examined by using a multiregional projections model. Two alternative futures describing coal production, one emphasizing heavy eastern development and the other emphasizing heavy western development, are analyzed using the MULTIREGION model. The study indicates that quite different development patterns may occur in the east and west. In the east, coal development tends to generate a greater stimulative effect in regions hosting coal development proximate to the older core coal producing regions than in the core areas themselves. Growth from coal tends to spill out to non-producing regions as well. In the west, the greatest stimulative effects occur in major producing regions. However, rather than stimulating growth in non-producing regions, larger producing regions tend to compete with non-producing regions and even with smaller producing regions for growth. It is emphasized that these findings result from examining the outputs of a regional systems model which is specified to capture regional interactions. For this reason, events in a given region affect those in others, and the model outputs permit examining the process of regional growth in a more general way than would be possible were regional independence assumed. (ERA citation 05:020040)

PAT-APPL-6-005 264 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Thermochemical Cycles for the Production of Hydrogen.
Patent Application,
M. Steinberg, and V. D. Dang. Filed 22 Jan 79, 20p
Contract EY-76-C-02-0016
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Two-step processes for the preparation of hydrogen are described: CrCl sub 3 (g) implies CrCl sub 2 (g) + 1/2Cl sub 2 (g) and CrCl sub 2 (s) + HCl(g) reversible CrCl sub 3 (s) + 1/2H sub 2 (g); UCl sub 4 (g) implies UCl sub 3 (g) + 1/2Cl sub 2 (g) and UCl sub 3 (s) + HCl(g) implies UCl sub 4 (s) + 1/2H sub 2 (g); and CaSO sub 4 (s) implies CaO(s) + SO sub 2 (g) + 1/2O sub 2 (g) and CaO(s) + SO sub 2 (g) + H sub 2 O(l) implies CaSO sub 4 (s) + H sub 2 (g). The high temperature available from solar collectors, high temperature gas reactors or fusion reactors is utilized in the first step in which the reaction is endothermic. The efficiency is at least 60% and with process heat recovery, the efficiency may be increased up to 74.4%. An apparatus fr carrying out the process in conjunction with a fusion reactor, is described. (ERA citation 05:023768)

PAT-APPL-6-050 379 PC **A02**/MF **A01**
Department of Energy, Washington, DC.
Thermochemical Cyclic System for Splitting Water and/or Carbon Dioxide by Means of Cerium Compounds and Reactions Useful Therein.
Patent Application,
C. E. Bamberger, and P. R. Robinson. Filed 20 Jun 79, 21p
Contract W-7405-ENG-26
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A thermochemical cyclic process for producing hydrogen from water comprises reacting ceric oxide with monobasic or dibasic alkali metal phosphate to yield a solid reaction product, oxygen and water. The solid reaction product, alkali metal carbonate or bicarbonate, and water, are reacted to yield hydrogen, ceric oxide, carbon dioxide and trialkali metal phosphate. Ceric oxide is recycled. Trialkali metal phosphate, carbon dioxide and water are reacted to yield monobasic or dibasic alkali metal phosphate and alkali metal bicarbonate, which are recycled. The cyclic process can be modified for producing carbon monoxide from carbon dioxide by reacting the alkali metal cerous phosphate and alkali metal carbonate or bicarbonate in the ab-

sence of water to produce carbon monoxide, ceric oxide, carbon dioxide and trialkali metal phosphate. Carbon monoxide can be converted to hydrogen by the water gas shift reaction. (ERA citation 05:023769)

PAT-APPL-6-150 115 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Pasadena Office, CA.
Solar-Heated Fluidized Bed Gasification System.
Patent Application,
S. A. Qader. Filed 15 May 80, 13p N80-24747/1, NASA-CASE-NPO-15071-1
Contract NAS7-100
This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

A solar-powered fluidized bed gasification system for gasifying carbonaceous material is disclosed. The system includes a solar gasifier which is heated by fluidizing gas and steam. Energy to heat the gas and steam is supplied by a high heat capacity refractory honeycomb which surrounds the fluid bed reactor zone. The high heat capacity refractory honeycomb is heated by solar energy focused on the honeycomb by solar concentrator through solar window. The fluid bed reaction zone is also heated directly by thermal contact to the high heat capacity ceramic honeycomb with the walls of the fluidized bed reactor. Provisions are also made for recovering and recycling catalysts used in the gasification process. A back-up furnace is provided for start-up procedures and for supplying heat to the fluid bed reaction zone when adequate supplies of solar energy are not available.

PB80-192123 PC **A07**/MF **A01**
Santa Clara Univ., CA. Dept. of Mechanical Engineering.
Methanol/Ethanol/Gasoline Blend Fuels Demonstration with Statified Charge Engine Vehicles.
Consultant rept. (Final),
R. Pefley, H. Adelman, and T. Suga. Mar 80, 135p CAEC-49, CAEC-500-80-14

Four 1978 Honda CVCC vehicles have been in regular use by California Energy Commission staff in Sacramento for 12 months. Three of the unmodified vehicles were fueled with alcohol/gasoline blends (5% methanol, 10% methanol, and 10% ethanol) with the fourth remaining on gasoline as a control. The demonstration and testing have established the following: (1) the tested blends cause no significant degradation in exhaust emissions, fuel economy, and driveability; (2) the tested blends cause significant increases in evaporative emissions; (3) analysis of periodic oil samples shows no evidence of accelerated metal wear; and (4) higher than 10% alcohols will require substantial modification to most existing California motor vehicles for acceptable emissions, performance, and fuel economy. In addition, the report discusses many aspects of using methanol and ethanol fuels, both straight and in blends, in various engine technologies.

PB80-193592 PC **A03**/MF **A01**
Pitt (Norman), Inc., Montebello, CA. Agrotherm Div.
Cotton Gin Trash Incinerator-Air Heat Project.
Consultant rept. (Final).
May 80, 39p CAEC-53, CAEC-500-80-018

The California Energy Commission has funded the final phase of a four year project resulting in development of a successful system for burning cotton gin trash as a fuel providing the heat for ginning. The incinerator - air heater system installed in Corcoran, California operates continuously throughout the ginning season. Trash feeding and burning rate is automatically controlled from the combustion temperature, hot air temperature is controlled by the drying needs, and ashes are automatically removed from the system and pneumatically conveyed to the disposal site. The system complies with state and county air pollution codes by means of baghouse collectors. Savings in fossil fuel and trash disposal costs have demonstrated the equipment system is feasible for a four year pay back at large, well utilized gins.

PB80-195019 PC **A04**/MF **A01**
California Energy Commission, Sacramento.
The Potential of Energy Farming in the Southeastern California Desert.
Staff rept. (Final),
Virginia Lew. Apr 80, 64p CAEC-66, CAEC-500-80-017

This report considers the use of marginal desert lands in southeastern California for the siting of energy farms using acacia, eucalyptus, euphorbia, guayule, jojoba, mesquite, or tamarisk.

PB80-197049 PC **A04**/MF **A01**
National Alcohol Fuels Commission, Washington, DC.
Federal Agency Compendium: Federal Agency and Department Alcohol Fuels Programs.
Jun 80, 55p NAFC/80-03

The report contains a detailed description of all current Federal alcohol fuels programs and financial assistance.

PB80-197239 PC **A04**/MF **A01**
California Univ., Davis. Dept. of Agricultural Engineering.
An Investigation of the Down-Draft Gasification Characteristics of Agricultural and Forestry Residues: Interim Report.
Consultant rept.
Nov 79, 55p CAEC-67, CAEC-500-79-0017

This Interim Report provides an overview of the experimental work conducted with the Laboratory Gas Producer to determine the gasification characteristics of twenty-four agricultural and wood residues. The test objectives were: (1) determine the gasification characteristics of the fuels; (2) the associated physical and chemical characteristics of the fuels and their gasification residues; and (3) the potential for the fuel to produce slag in the gas producer reaction zones. Each test was conducted for a period of six hours if slagging did not shorten the run period.

PB80-812951 PC **N01**/MF **N01**
National Technical Information Service, Springfield, VA.
Natural Gas: Marine Transportation. 1964-June, 1980 (Citations from the NTIS Data Base).
Rept. for 1964-Jun 80,
Guy E. Habercom, Jr. Jul 80, 153p
Supersedes NTIS/PS-79/0755 and NTIS/PS-78/0729.

Abstracts are presented of studies on various aspects of marine transportation of liquefied natural gas. This includes reports on forecasts, cargo tank design, terminal facilities, spills, safety aspects, special tanker design, and handling equipment. (This updated bibliography contains 143 citations, 8 of which are new entries to the previous edition.)

21E. Jet and Gas Turbine Engines

AD-A084 789/7 PC **A06**/MF **A01**
Rutgers - the State Univ New Brunswick NJ Dept of Mechanical Industrial and Aerospace Engineering
Calculation of High Speed Inlet Flows Using the Navier-Stokes Equations. Volume I. Description of Results.
Final rept. Apr 78-Sep 79,
Doyle D. Knight. Feb 80, 112p AFFDL-TR-79-3138-VOL-1
Contract F33615-78-C-3008
See also Volume 2. AD-A084 790. Presented at the AIIA Aerospace Sciences Meeting (18th), Pasadena, CA Jan 80.

A set of computer programs has been developed to calculate the flowfield in two-dimensional mixed-compression high speed inlets. The full mean compressible Navier-Stokes equations are utilized, with turbulence represented by an algebraic eddy viscosity model which incorporates a relaxation correction. A curvilinear body-oriented coordinate system is employed to allow handling of arbitrary inlet contours. Boundary layer bleed is incorporated. The numerical algorithm of MacCormack is employed to solve the Navier-Stokes equations. A variety of techniques are incorporated to improve code efficiency, including time-splitting of the finite-difference operators, automatic mesh-splitting, and a separate algorithm for the treatment of the viscous sublayer portion of the turbulent boundary layers. The numerical codes have been successfully applied to the calculation of a variety of flows including shock-boundary layer interaction on a flat plate (including both unseparated and separated cases), and three different simulated high speed inlet configurations. In all cases, good agreement was obtained with the experimental data.

AD-A084 790/5 PC **A07**/MF **A01**
Rutgers - the State Univ New Brunswick NJ Dept of Mechanical Industrial and Aerospace Engineering
Calculation of High Speed Inlet Flows using the Navier-Stokes Equations. Volume II. User's and Programmer's Guide.
Final rept. Apr 78-Sep 79,
Doyle D. Knight. Feb 80, 138p AFFDL-TR-79-3138-VOL-2
Contract F33615-78-C-3008
See also Volume 1, AD-A084 789.

For abstract see AD-A084 789.

AD-A084 934/9 PC **A11**/MF **A01**
Pratt and Whitney Aircraft Group West Palm Beach FL Government Products Div
Cumulative Damage Fracture Mechanics Under Engine Spectra.
Final rept. 1 Sep 77-31 Jan 80,
J. M. Larsen, B. J. Schwartz, and C. G. Annis, Jr. Jan 80, 234p PWA-FR-11844, AFML-TR-79-4159
Contract F33615-77-C-5153

An empirically based mathematical model and computer code capable of predicting cumulative damage effects on fatigue crack growth in engine disks has been developed for Waspaloy (PWA 1007) and IN100 (PWA 1073). The computing software segregates a complex loading mission, applies a multi-parameter interpolation procedure to determine cycle-by-cycle crack growth, and performs a specimen life calculation. The model was developed from a broad matrix of tests of both materials, and a number of auxiliary investigations were conducted to examine the range of applicability of the model. (Author)

AD-A085 064/4 PC **A05**/MF **A01**
Naval Postgraduate School Monterey CA
A Comparison of Solid Fuel Ramjet Flow Characteristics and Combustion Behavior.
Master's thesis,
Brian Andrew Binn. Dec 79, 83p

An experimental investigation was conducted to determine if there is a relationship between the cold flow characteristics of velocity, pressure distribution, and turbulence intensity and the reacting flow performance and combustion characteristics of a solid fuel ramjet. The effects of configuration and air flow changes on the above characteristics were examined. Average regression rates and combustion efficiencies were not significantly affected by changes in configuration. These variations in test conditions significantly affected the center-line turbulence intensity but not the near-wall turbulence intensity in cold flow. The use of bypass resulted in decreases in regression rate and efficiencies for all cases. Attainable performance appears to be most strongly related to near-wall turbulence intensity/mixing and to the amount of fuel reaching the aft mixing chamber. (Author)

AD-A085 176/6 PC **A06**/MF **A01**
DyTec Engineering Inc Huntington Beach CA
Review of Turbofan-Engine Combustion and Jet-Noise Research and Related Topics.
Final rept.,
Alan H. Marsh, and Gary L. Blankenship. Jan 80, 121p DYTEC-7936, FAA/RD-80-16

In the early 1970s, internal sources of noise in jet engines were identified as being potentially strong enough to affect the levels of jet-aircraft noise at the Far Part 36 noise-certification points. These internal sources have a broadband spectrum and are not related to the rotating turbomachinery components within the engine. A review of the status of jet- and core-engine noise research was held at FAA Headquarters in the Fall of 1974. Sub-

sequent to that status review, the FAA sponsored additional studies of combustion noise. Also, during this period, a significant study of jet noise produced by high-velocity jets was conducted under the initial sponsorship of DOT, and then of FAA. The high-velocity jet-noise study included extensive analytical and experimental investigations of jet-noise suppressors as well as studies of the effects of forward motion on jet-engine noise. In February 1977, the FAA and the DOT a second Conference at FAA Headquarters to review the status of jet- and combustion-noise research. The Conference was attended by representatives from Government and Industry and presentations were made of contracted and independent research studies. This report reviews the research findings presented at the February 1977 Jet/Combustion-Noise Research Conference as well as subsequent to the Conference through June 1979. (Author)

AD-A085 179/0 PC **A07**/MF **A01**
Gates Learjet Corp Wichita KS
Engine Inlet Anti-Icing System Evaluation Procedure.
Final rept.,
Allyn Heinrich, Richard Ross, and Nick Ganesan. Jan 80, 143p FAA/RD-80-50
Contract DOT-FA76WA-3852

The objectives of this work were to develop a procedure for predicting and evaluating the performance of engine inlet anti-icing systems for compliance with FAR 25 ice protection requirements without conducting flight tests in natural icing conditions. This must include consideration of water droplet impingment, collection efficiency, internal and external heat transfer, and mass transfer of the impinging water. The method of approach for developing these procedures was to survey current analysis methods involving physical theory and empirical methods and then to develop a computerized model for use in anti-icing system performance analysis. Icing wind tunnel tests were conducted using a three-dimensional nacelle test model to aid in the procedure development. A typical engine-inlet anti-icing system was evaluated with the computer model in a variety of icing environments and operational conditions and compared with icing wind tunnel test results. Correlation between performance predictions and wind tunnel test results was found to have good agreement within the spectrum of conditions that were practicable in the wind tunnel. (Author)

AD-A085 197/2 PC **A08**/MF **A01**
Solar Turbines International San Diego CA
Development and Evaluation of Processes for Deposition of Ni/Co-Cr-Aly (MCrAly) Coatings for Gas Turbine Components.
Final rept. 1 Nov 76-1 Sep 78,
L. Hsu, W. G. Stevens, and A. R. Stetson. Sep 79, 161p SR79-R-4571-18, AFML-TR-79-4097
Contract F33615-76-C-5379

The application of MCrAlY (M = Ni or Co or Ni + Co) coatings to high-temperature turbine blades and vanes is primarily provided by the electron beam, physical vapor deposition (PVD) process. Two major drawbacks of the PVD MCrAlY coating are high cost and line-of-sight (LOS) limitation. The controlled composition reaction sintered (CCRS) MCrAlY process was developed as a cost-effective, non-LOS alternative to the PVD coating process. The objective of this program were to develop the non-LOS technique for coating complex clustered airfoil configurations and to extensively test and evaluate the mechanical, thermal shock and environmental properties of the CCRS CoNiCrAlY coating relative to commercially available PVD NiCrAlY, PVD CoCrAlY and CODEP B coatings. The CCRS process can be either LOS or non-LOS, depending on part geometry. The former consists of slurry spraying the CoNiCrAlY powder onto the cleaned part followed by reaction sintering in a controlled activity aluminized pack. The latter utilizes an electrophoretic plus fluidized bed (E/FB) approach to deposit the CoNiCrY bisque prior to aluminization. When applied to nickel-base alloys (Rene' 125 and MA754) full densification of the CoNiCrAlY coating was achieved; however, the coating had greater porosity on cobalt-base X-40 alloy. The nominal composition of CCRS CoNiCrAlY on Rene' 125 and X-40 are Co(bal)/33-42Ni/6-10Cr/12-19Al/Y and Co(bal)/18Ni/10-20Cr/14-16Al/Y, respectively.

AD-A085 403/4 PC **A04**/MF **A01**
Georgia Inst of Tech Atlanta School of Aerospace Engineering
Noise Suppression in Jet Inlets.
Final technical rept. 1 Feb 79-31 Jan 80,
Ben T. Zinn, William L. Meyer, and Brady R. Daniel. Feb 80, 54p AFOSR-TR-80-0452
Contract F49620-77-C-0066
See also Rept. Nos. AFOSR-TR-78-0696 AD-A054 173 and AFOSR-TR-79-0614, AD-A069 787.

This research program was concerned with the development of an analytical technique, based on an integral representation of the external solutions of the Helmholtz equation, for the prediction of the sound radiated from complicated, acoustically lined, axisymmetric bodies having complex sound sources. The purpose of this research program was to generate efficient computer codes for the prediction of the sound radiated from acoustically lined jet engine inlets. In the experimental tests two geometrical configurations were studied, a straight duct and a jet engine inlet. Both of these configurations were tested with hard walls and the straight duct was tested with an acoustic liner consisting of a matrix of Helmholtz resonators. It was found that very good agreement was obtained for the hard walled configurations while there were some discrepancies with the lined wall case. It is conjectured that this discrepancy in some of the lined wall results is mainly due to the particular liner theory used to calculate the effective admittance of the liner.

AD-A085 462/0 PC **A02**/MF **A01**
Advisory Group for Aerospace Research and Development Neuilly-sur-Seine (France)
Technical Evaluation Report on the Propulsion and Energetics Panel 54th (A) Meeting Advanced Control Systems for Aircraft Powerplants.
Advisory rept.,
J. David Powell. Mar 80, 14p Rept no. AGARD-AR-152
See also Rept. no. AGARD-CP-274, AD-A084 845. Presented at the Specialists Meeting of Propulsion and Energetics Panel(54th(A)) held at DFVLR, Cologne, Germany on 1-2 October 1979.

This Technical Evaluation Report on the Propulsion and Energetics 54th (A) Specialists' Meeting on Advanced Control Systems for Aircraft Powerplants contains a survey on the nineteen papers presented, and of the discussion which followed each paper, as well as of the concluding Round Table Session. Conclusions are drawn. The papers presented at the meeting together with the discussions are published as AGARD Conference Proceedings No.274 - Advanced Control Systems for Aircraft Powerplants. This Advisory Report was prepared at the request of the Propulsion and Energetics Panel of AGARD. (Author)

N80-25332/1 PC **A04**/MF **A01**
Pratt and Whitney Aircraft Group, East Hartford, CT. Commercial Products Div.
Engine Component Improvement: Performance Improvement, Jt9d-7 3.8 AR Fan.
Progress Report, Jan. 1978 - Feb. 1979.
W. O. Gaffin. 12 Jun 80, 57p NASA-CR-159806, PWA-5515-114
Contract NAS3-20630

A redesigned, fuel efficient fan for the JT9D-7 engine was tested. Tests were conducted to determine the effect of the 3.8 AR fan on performance, stability, operational characteristics, and noise of the JT9D-7 engine relative to the current 4.6 AR Bill-of-Material fan. The 3.8 AR fan provides increased fan efficiency due to a more advanced blade airfoil with increased chord, eliminating one part span shroud and reducing the number of fan blades and fan exit guide vanes. Engine testing at simulated cruise conditions demonstrated the predicted 1.3 percent improvement in specific fuel consumption with the redesigned 3.8 AR fan. Flight testing and sea level stand engine testing demonstrated exhaust gas temperature margins, fan and low pressure compressor stability, operational suitability, and noise levels comparable to the Bill-of-Material fan.

N80-25333/9 PC **A12**/MF **A01**
Pratt and Whitney Aircraft, East Hartford, CT. Commercial Products Div.
Study of Blade Aspect Ratio on a Compressor Front Stage.
Final Report, 28 Oct. 1977 - 28 May 1979.
R. F. Behlke, J. D. Brooky, and E. Canal, Jr.. Nov 80, 261p NASA-CR-159556, PWA-5583-58
Contract NAS3-20809

A single stage, low aspect ratio, compressor with a 442.0 m/sec (1450 ft/sec) tip speed and a 0.597 hub/tip ratio typical of an advanced core compressor front stage was tested. The test stage incorporated an inlet duct which was representative of an engine transition duct between fan and high pressure compressors. At design speed, the rotor stator stage achieved a peak adiabatic efficiency of 86.6 percent at a flow of 44.35 kg/sec (97.8 lbm/sec) and a pressure ratio of 1.8. Surge margin was 12.5 percent from the peak stage efficiency point.

N80-25337/0 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Design and Cold-Air Test of Single-Stage Uncooled Turbine with High Work Output.
T. P. Moffitt, E. M. Szanca, W. J. Whitney, and F. P. Behning. Jun 80, 18p NASA-TP-1680, E-316

A solid version of a 50.8 cm single stage core turbine designed for high temperature was tested in cold air over a range of speed and pressure ratio. Design equivalent specific work was 76.84 J/g at an engine turbine tip speed of 579.1 m/sec. At design speed and pressure ratio, the total efficiency of the turbine was 86.6 percent, which is 0.6 point lower than the design value of 89.2 percent. The corresponding mass flow was 4.0 percent greater than design.

N80-25338/8 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Cold-Air Investigation of a 4 1/2 Stage Turbine with Stage-Loading Factor of 4.66 and High Specific Work Output. 2: Stage Group Performance.
W. J. Whitney, F. P. Behning, T. P. Moffitt, and G. M. Hotz. Jun 80, 16p NASA-TP-1688, E-315

The stage group performance of a 4 1/2 stage turbine with an average stage loading factor of 4.66 and high specific work output was determined in cold air at design equivalent speed. The four stage turbine configuration produced design equivalent work output with an efficiency of 0.856; a barely discernible difference from the 0.855 obtained for the complete 4 1/2 stage turbine in a previous investigation. The turbine was designed and the procedure embodied the following design features: (1) controlled vortex flow, (2) tailored radial work distribution, and (3) control of the location of the boundary-layer transition point on the airfoil suction surface. The efficiency forecast for the 4 1/2 stage turbine was 0.886, and the value predicted using a reference method was 0.862. The stage group performance results were used to determine the individual stage efficiencies for the condition at which design 4 1/2 stage work output was obtained. The efficiencies of stages one and four were about 0.020 lower than the predicted value, that of stage two was 0.014 lower, and that of stage three was about equal to the predicted value. Thus all the stages operated reasonably close to their expected performance levels, and the overall (4 1/2 stage) performance was not degraded by any particularly inefficient component.

N80-25339/6 PC **A03**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Static and Transient Performance of YF-102 Engine with Up to 14 Percent Core Airbleed for the Quiet Short-Haul Research Aircraft.
J. G. Mcardle, L. Homyak, and A. S. Moore. Jun 80, 26p NASA-TP-1692

An outdoor static test stand was used to measure the steady-state and transient performance of the YF-102 turbofan engine with core airbleed. The test configuration included a bellmouth inlet and a confluent-flow exhaust system similar in size to the quiet short-haul research aircraft (QSRA) exhaust system. For the steady-state tests, the engine operated satisfactorily with core bleed up to 14 percent of the core inlet flow. For the transient tests

the engine accelerated and decelerated satisfactorily with no core bleed and with core bleed up to 11 percent of the core inlet flow (maximum tested). For some of the tests the core-bleed flow rate was scheduled to vary with fan discharge pressure, to simulate the QSRA bleed requirements. No stability, surge, stall, overtemperature, combustor flameout, or other operating problems were encountered in any of the tests. Steady-state and transient engine performance data are presented in graphs, and fuel-control trajectories for typical transient tests are shown.

N80-25340/4 PC **A09**/MF **A01**
Pratt and Whitney Aircraft Group, East Hartford, CT. Commercial Products Div.
Performance Deterioration Based on In-Service Engine Data: Jt9d Jet Engine Diagnostics Program.
G. P. Sallee. 27 Apr 79, 185p NASA-CR-159525, PWA-5512-35
Contract NAS3-20632

Results of analyses of engine performance deterioration trends and levels with respect to service usage are presented. Thirty-two JT9D-7A engines were selected for this purpose. The selection of this engine fleet provided the opportunity of obtaining engine performance data starting before the first flight through initial service such that the trend and levels of engine deterioration related to both short and long term deterioration could be more carefully defined. The performance data collected and analyzed included in-flight, on wing (ground), and test stand prerepair and postrepair performance calibrations with expanded instrumentation where feasible. The results of the analyses of these data were used to: (1) close gaps in previously obtained historical data as well as augment the historical data with more carefully obtained data; (2) refine preliminary models of performance deterioration with respect to usage; (3) establish an understanding of the relationships between ground and altitude performance deterioration trends; (4) refine preliminary recommendations concerning means to reduce and control deterioration; and (5) identify areas where additional effort is required to develop an understanding of complex deterioration issues.

N80-25382/6 PC **A06**/MF **A01**
Hamilton Standard, Windsor Locks, CT.
Diffusion Bonded Boron/Aluminum Spar-Shell Fan Blade.
Final Report, Jun. 1977 - May 1978.
C. E. K. Carlson, J. L. Cutler, W. J. Fisher, and J. V. W. Memmott. Jun 80, 114p NASA-CR-159571, HSER-7968
Contract NAS3-20407

Design and process development tasks intended to demonstrate composite blade application in large high by-pass ratio turbofan engines are described. Studies on a 3.0 aspect radio space and shell construction fan blade indicate a potential weight savings for a first stage fan rotor of 39% when a hollow titanium spar is employed. An alternate design which featured substantial blade internal volume filled with titanium honeycomb inserts achieved a 14% potential weight savings over the B/M rotor system. This second configuration requires a smaller development effort and entails less risk to translate a design into a successful product. The feasibility of metal joining large subsonic spar and shell fan blades was demonstrated. Initial aluminum alloy screening indicates a distinct preference for AA6061 aluminum alloy for use as a joint material. The simulated airfoil pressings established the necessity of rigid air surfaces when joining materials of different compressive rigidities. The two aluminum alloy matrix choices both were successfully formed into blade shells.

N80-25453/5 PC **A07**/MF **A01**
United Technologies Corp., East Hartford, CT.
External Fuel Vaporization Study, Phase 1.
E. J. Szetela, and L. Chiappetta. Jun 80, 133p NASA-CR-159850, UTRC-R80-914607-12
Contract NAS3-21971

A conceptual design study was conducted to devise and evaluate techniques for the external vaporization of fuel for use in an aircraft gas turbine with characteristics similar to the Energy Efficient Engine (E(3)). Three vaporizer concepts were selected and they were analyzed from the standpoint of fuel thermal stability, integration of the vaporizer system into the aircraft engine, engine and vaporizer dynamic response, startup and altitude restart, engine performance, control requirements, safety, and maintenance. One of the concepts was found to improve the performance of the baseline E(3) engine without seriously compromising engine startup and power change response. Increased maintenance is required because of the need for frequent pyrolytic cleaning of the surfaces in contact with hot fuel.

N80-25454/3 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
Analytical and Experimental Evaluations of the Effect of Broad Property Fuels on Combustors for Commercial Aircraft Gas Turbine Engines.
A. L. Smith. Jun 80, 20p NASA-TM-81496, E-433
Presented at 16TH Joint Propulsion Conf., Hartford, Conn., 30 Jun. - 2 Jul. 1980; Sponsored by Aiaa, Asme, and Sae.

The impacts of broad property fuels on the design, performance, durability, emissions, and operational characteristics of current and advanced combustors for commercial aircraft gas turbine engines were studied. The effect of fuel thermal stability on engine and airframe fuel system was evaluated. Tradeoffs between fuel properties, exhaust emissions, and combustor life were also investigated. Results indicate major impacts of broad property fuels on allowable metal temperatures in fuel manifolds and injector support, combustor cyclic durability, and somewhat lesser impacts on starting characteristics, lightoff, emissions, and smoke.

PAT-APPL-6-148 649 PC **A02**/MF **A01**
Department of the Navy Washington DC
Borescope Guide.
Patent Application,
Thomas N. Swenazhowski. Filed 12 May 80, 12p AD-D007 238/9
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

An assemblage of tubular members for channeling, and thereby guiding, the fiber optic cable of a borescope into the recesses of an aircraft engine. A relatively flexible portion is topped by a rigid portion that is capped by a handle. The portions are removable housed in a larger tube that has a curved lower portion to provide direction to the flexible tube and optic cable. The borescope cable is extended down through the handle and out the flexible portion, and can be maneuvered by turning the handle. (Author)

PATENT-4 203 285 Not available NTIS
Department of the Air Force Washington DC
Partial Swirl Augmentor for a Turbofan Engine.
Patent,
Kurt J. Hanloser, Raymond J. Bruchez, and James T. Gill, Jr. Filed 6 Feb 78, patented 20 May 80, 5p AD-D007 279/3, PAT-APPL-875 664
Supersedes PAT-APPL-875 664-78, AD-D005 071.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

This abstract describes a partial swirl augmentor for a turbofan engine having an annular duct for directing hot gases into the augmentor combustion chamber. Located within the combustion chamber is a piloted vee-gutter flameholder system which has a circumferential pilot located at the outer edge of the swirling hot turbine exhaust gas stream. As a result thereof, the partial swirl augmentor can attain state-of-the-art engine after burning thrust levels with an increased altitude blow-out limit. (Author)

PATENT-4 203 286 Not available NTIS
Department of the Air Force Washington DC
Cooling Apparatus for an Exhaust Nozzle of a Gas Turbine Engine.
Patent,
Robert E. Warburton. Filed 30 Oct 78, patented 20 May 80, 8p AD-D007 276/5, PAT-APPL-956 305
Supersedes PAT-APPL-956 305-78, AD-D005 679.
Availability: This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231 $0.50.

A cooling control system for a convergent-divergent gas turbine exhaust nozzle which permits automatic ducting of cooling air during the augmented mode of engine operation. The convergent flaps of the nozzle have longitudinal ducts embedded therein with a pair of openings near the aft extreme of each of the convergent flaps and openings located in the forward half of the convergent flaps. The convergent seals overlap the convergent flaps and are slideably mounted for positioning over the aft openings on the flaps. A positive pressure is generated under the convergent flap liner and seal liner when the convergent seal is opened to allow cooling air to be ducted through the flap. The positive pressure forces the convergent flap and seal liners up toward the center line of the nozzle. (Author)

PB80-808611 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Axial Flow Compressors. 1970-April, 1980 (Citations from the Engineering Index Data Base).
Rept. for 1970-Apr 80,
Robert Hippler. May 80, 140p
Sponsored in part by National Technical Information Service, Springfield, VA.

Various axial-flow compressors used in jet engines, gas turbines, turbo fans, ultra centrifuges, and in other turbo machinery, are treated in these abstracts. Citations center on design, including blades and rotors, and materials, measurements of flow, performance, and applications. (Contains 123 citations)

21G. Reciprocating Engines

DOE/CS/30202-T1 PC **A02**/MF **A01**
Hittman Associates, Inc., Columbia, MD.
Use of Organic Working Fluids in Rankine Engines.
H. M. Curran. Sep 79, 23p
Contract AC03-79CS0202

A compilation is presented of state-of-the-art data on the use of organic working fluids in operational Rankine cycle engines. Particular attention is given to the determination of the maximum temperatures used for various working fluids in operational Rankine cycle engines and identification of thermal instability and chemical reaction problems related to these temperatures. Information is included on the characteristics and selection of working fluids; the behavior of lubricating oils in contact with working fluids; operational experience; and recommended organic fluids R and D. (ERA citation 05:022840)

PB80-192701 PC **A06**/MF **A01**
Little (Arthur D.), Inc., Cambridge, MA.
Potential of Spark Ignition Engine, Electronic Engine and Transmission Control.
Final rept. Jan-Jul 78,
Frank J. Garofalo. Mar 80, 105p DOT-TSC-NHTSA-79-55, DOT-HS-805 134
Contract DOT-TSC-1046

This report identifies, evaluates, and documents the characteristics and functions of significant electronic engine and powertrain control systems. Important considerations in the assessment are the powertrain variables controlled, the technology utilized, and the fuel economy gains achieved. A detailed analysis, by engine class and control system technology, is made in order to quantify specific advantages of various electronic systems and their capability to achieve increased engine efficiency and vehicle fuel economy. An attempt is made to identify the minimum technology required to move from the 1978 emission standards of 1.5 HC/15.0 CO/2.0 NOx to the 1981 emission standard of .41 HC/3.4 CO/1.0 NOx with no fuel economy losses. This 1981 standard and the level of technology required to achieve it represents a baseline from which an analysis of further potential fuel economy gains via electronic control systems is made.

PB80-195746 PC **A04**/MF **A01**
Transportation Systems Center, Cambridge, MA.
Potential of Diesel Engine, Diesel Engine Design Concepts, Control Strategy and Implementation.
Final rept.,
T. Trella, and T. Shen. Mar 80, 61p DOT-TSC-NHTSA-79-41, DOT-HS-805 240

Diesel engine design concepts and control system strategies are surveyed with application to passenger cars and light trucks. The objective of the study is to indicate the fuel economy potential of the technologies investigated. The engine design parameters discussed are related to the engine configuration, combustion process, valving, friction, compression ratio, and heat transfer. Various engine control strategies and control implementation are considered.

21H. Rocket Motors and Engines

AD-A085 630/2 PC **A07**/MF **A01**
Ogden Air Logistics Center Hill AFB UT Propellant Lab Section
Propellant Surveillance Report LGM-30 F & G Stage I. Phase G. Series VIII, TP-H1011.
Semi-annual rept.,
John A. Thompson. Apr 80, 134p Rept no. MANCP-438(80)

This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30 F and G First Stage Minuteman Motors. This report uses a statistical approach to analyze the bulk carton propellant data. Testing was accomplished in accordance with MMWRM Project M04046C-WNL01529. The data from this test period are combined with data from previous testing and entered into the G085 Computer for storage, analysis and regression analysis. From the statistical analysis of all data tested to date (fourteen years for F and G), significant degradation of the propellant does not appear likely for at least two years past the oldest data point. Each point on the regression plot represents the mean of all samples at that particular age. The number of samples at each point is indicated on the sample size summary sheet on the page accompanying each regression plot or group of regression plots. The data range at any age can be found by suitable inquiry of the G085 system. (Author)

AD-A085 806/8 PC **A04**/MF **A01**
Aerospace Corp El Segundo CA Engineering Group
One- and Two-Phase Nozzle Flows.
Final rept. Jan 78-Jan 80
I-Shih Chang. 31 Jan 80, 64p TR-0080(5901-01)-1, SD-TR-80-26
Contract F04701-79-C-0080

A time-dependent technique, in conjunction with the boundary-fitted coordinates system, is applied to solve a gas-only one-phase flow and a fully-coupled, gas-particle two-phase flow inside nozzles with small throat radii of curvature, steep wall gradients, and submerged configurations. The emphasis of the study has been placed on one- and two-phase flow in the transonic region. Various particle size and particle mass fractions have been investigated in the two-phase flow. The salient features associated with the two-phase nozzle flow compared with those of the one-phase flow are illustrated through the calculations for a JPL nozzle configuration, for the Titan III solid rocket motor nozzle, and for the submerged nozzle configuration utilized in the Inertial Upper Stage (IUS) solid rocket motor. (Author)

N80-25375/0 PC **A02**/MF **A01**
Technische Universitaet, Munich (Germany, F.R.). Lehrstuhl fuer Raumfahrttechnik.
Performance Prediction of Power Augmented Electrothermal Hydrazine Thrusters.
D. Hayn, M. Braitinger, and R. H. Schmucker. May 78, 10p TUM-LRT-KB-78/1

Monopropellant hydrazine propulsion systems are almost exclusively used as auxiliary propulsion systems for satellite orbit and attitude control with large total impulse and long operational life. A detailed analysis of the nozzle flow and the losses including boundary layer, two dimensional flow, and kinetics is presented. The data derived are compared to experimental results. Results show that performance improvement can be achieved by increasing the enthalpy of the hydrazine decomposition productes via an electrical resistive heater so that the gas temperature significantly grows. The performance increase is limited by the maximum tolerable chamber temperature and the conversion of thermal energy into kinetic energy of the exhaust jet.

21I. Rocket Propellants

AD-A084 906/7 PC **A03**/MF **A01**
Naval Surface Weapons Center Silver Spring MD
DDT Behavior of Porous Propellant Models and Porous Samples of Commercial Propellants.
Donna Price, and Richard R. Bernecker. 13 Mar 80, 44p Rept no. NSWC/TR-80-65

A number of binary mixtures, components of which are propellant ingredients, were examined in steel walled tubes for their DDT behavior at 60-70% theoretical maximum density (TMD). Several commercial propellants and one 4-component, composite model were also examined. A number of compositional effects were noted and reported. Some propellants, at high porosity, showed reaction not detectable by our ionization probes. For propellants which exhibited transition at 70% TMD in our apparatus, the range in predetonation column length (l) was 103-170 mm and in relative time to detonation, 76-247 micro. (Author)

AD-A084 962/0 PC **E15**/MF **E15**
Johns Hopkins Univ Laurel MD Chemical Propulsion Information Agency
JANNAF Safety and Environmental Protection Specialist Session (1980), Monterey, California, 12 March 1980.
John A. E. Hannum. Apr 80, 189p Rept no. CPIA-PUB-313
Contract N00024-78-C-5384
Availability: Chemical Propulsion Information Agency, Johns Hopkins Road, Laurel, MD 20810 (No copies furnished by DTIC).

This publication contains eleven technical papers presented at the 1980 Specialist Session of the Joint Army-Navy-NASA-Air Force (JANNAF) Safety and Environmental Protection Subcommittee held 12 March 1980 at the Hilton Resort Inn, Monterey, CA. The topics include: the environmental and safety impacts of hydrazine fuels; air quality impacts and standardized qualification testing of propellants, explosives and pyrotechnics; hazard assessment and environmental quality of liquid propellants; on-orbit debris hazards to the Space Shuttle; the impact of TOSCA and RCRA on propulsion activities; and simplified risk assessment methodology. (Author)

AD-A085 018/0 PC **A03**/MF **A01**
Army Armament Research and Development Command Aberdeen Proving Ground MD Ballistics Research Lab
The ARO Working Group Meeting on Ignition Processes, June 1978.
Memorandum rept.,
David R. Crosley, Robert A. Fifer, and George E. Keller. Mar 80, 40p ARBRL-MR-03005, AD-E430 436

A working group meeting was held at the Ballistic Research Laboratory on 15, 16 June 1978, under sponsorship of the Army Research Office, Durham. The general topic of discussion was ignition and combustion of propellants with a view toward development of an understanding from a microscopic basis, with particular emphasis on the influence of chemistry. The format of the workshop was unusual in that it was, by design, predominantly free discussion with little formal presentation scheduled, and closed attendance. Scientist from diverse areas related to propellant studies were invited; these specialties were thermal decomposition of propellants, gas phase chemical kinetics, investigations of solid propellant combustion diagnostics, and modeling. This report is a lightly-edited transcript of the proceedings. It also presents some views on the success of the workshop format. (Author)

AD-A085 186/5 PC **A06**/MF **A01**
Air Force Engineering and Services Center Tyndall AFB FL Engineering and Services Lab
The Effects of Amine Based Missile Fuels on the Activated Sludge Process.
Final rept. Jun 77-Jul 79,
Michael G. MacNaughton, and Jay A. Farmwald. Oct 79, 107p Rept no. AFESC/ESL-TR-79-39

The Air Force (AF) procures amine based hydrazine fuels for use in Titan II and III, Minuteman III, Bomarc and F-16 systems and is also responsible for the procurement, storage, and transport of such fuels in support of the National Aeronautics and Space Administration (NASA) and the AF Space Shuttle Program. This report summarizes data on the effects of Hydrazine (HZ), Monomethylhydrazine (MMH), and Unsymmetricaldimethylhydrazine (UDMH) in conventional activated sludge systems for semi-continuous addition of waste containing the fuels and for slug doses from accidental spills. It was concluded from the continuous feed studies that the three hydrazines could cause significant deterioration of an activated sludge plant if the concentration in the influent exceeded a few mg/l. For an aeration basin with a common hydraulic detention time of 9 hours, the efficiency of organic removal is seriously degraded when the influent concentration of HZ exceeds 10 mg/l. For UDMH and MMH this total failure results at concentrations of approximately 8 mg/l and 5 mg/l, respectively. Interpolating from these continuous feed studies, the 'no effect level' would be approximately 1 mg/l for HZ and 2 mg/l for MMH and UDMH. The influence of the hydrazines on nitrogen speciation of the sewage treatment plant effluent is more pronounced than that found for organic carbon oxidation. Inhibition of nitrification occurred at concentrations above 0.5 mg/l for MMH and 1 mg/l for the other fuels.

AD-A085 254/1 PC **A02**/MF **A01**
Whittaker Corp North Hollywood CA Shock Hydrodynamics Div
Projectile Impact Ignition Characteristics of Propellants.
Final rept. 1 Sep 76-30 Nov 79,
W. H. Andersen. May 80, 24p 3420-F, ARO-14396.10-E
Contract DAAG29-76-C-0063

The results of an investigation of the projectile impact ignition characteristics of propellants are described. Impact tests were conducted on a single, double and triple base propellant, and a deflagratable composite explosive. The tests were conducted by firing different diameter, flat-nosed brass projectiles into small cylinders of the propellant at various velocities and observing the impact reaction by various sensors. The general behavior of the four materials to impact was the same. The critical impact velocity necessary to induce a sustained reaction in a propellant decreased with increasing projectile diameter. The nature of the reaction depended on the diameter. At small diameters, the induced reaction was always detonation; whereas at the largest diameter the reaction was deflagration, whose intensity increased with increasing impact velocity. A higher critical velocity then again resulted in detonation. A model based on the view that the ignition and reaction in an impacted (shocked) propellant are independent processes was postulated to explain the results. The critical velocity for inducing ignition was consistent with the critical energy concept.

AD-A085 650/0 PC **A15**/MF **A01**
Princeton Univ NJ Dept of Mechanical and Aerospace Engineering
Nitramine Monopropellant Deflagration and General Nonsteady Reacting Rocket Chamber Flows.
Technical rept.,
Moshe BenReuven, and Leonard H. Caveny. Jan 80, 348p Rept no. MAE-1455
Contract N00014-75-C-0705

A theoretical investigation is presented, concerning the deflagration of cyclic nitramines (RDX, HMX), which emerged recently as high-energetic components in solid propellant formulations for rocket motors. The first part of this study involves a steady state deflagration analysis of these monopropellants. This serves as a necessary preliminary step in the elucidation of the rather complex deflagration mechanism of these compounds within a propellant matrix. Following the selection

of a plausible chemical mechanism model from the published literature, an asymptotic theory is advanced for the gaseous deflagration wave, derived from the large difference between the chemical relaxation scales associated with the two overall reactions under consideration. These point to the plausibility of distinct near field and (much wider) far field regions in the gas phase, obtaining a singular, boundary layer type problem. This line of reasoning has led to the derivation of a unique burning rate formula, showing increasing pressure dependence as pressure becomes higher, in agreement with experimental observations. The analysis demonstrates the primary importance of the near field, through which heat feedback to the propellant surface is controlled, and the relative importance of the far field processes in determining the overall pressure dependence.

PB80-808561 PC **N01**/MF **N01**
New England Research Application Center, Storrs, CT.
Aluminized Propellants and Explosives. 1970-April, 1980 (Citations from the NTIS Data Base).
Rept. for 1970-Apr 80,
Robert Hippler. May 80, 73p
Sponsored in part by National Technical Information Service, Springfield, VA.

The design, manufacture and use of aluminized propellants and explosives are the subject of the cited abstracts. Test data on the performance of these propellants and explosives are also given. Casting techniques, for insertion into the missile casing or other container, are described. (Contains 57 citations)

22. SPACE TECHNOLOGY

22A. Astronautics

N80-25354/5 PC **A06**/MF **A01**
Battelle Columbus Labs., Ohio.
SPAR 5 Experiment No. 74-30 Agglomeration in Immiscible Liquids.
Final Report.
S. Gelles, and A. J. Markworth. Jul 79, 116p
NASA-CR-161473
Contract NAS8-31543

The influence of gravity, cooling rate, and composition on the macro-and microstructure of liquid phase immiscible alloys were researched. Aluminum indium alloys of compositions 30, 40, 70, and 90 weight percent indium were processed aboard two sounding rocket flights, SPAR 2 and SPAR 5. Radiographic and metallographic examination of the SPAR 2 flight and ground base samples showed the expected separation at lg of the ground base alloys into indium rich and aluminum rich layers. The flight alloys produced an aluminum rich core surrounding by indium rich metal. The results obtained from the SPAR 5 40 and 70 weight percent indium alloys were essentially identical to those from SPAR 2. The 30 and 90 weight percent indium alloys also showed massive separation into configuration similar to the 40 and 70 weight percent indium alloys. The 90 weight percent indium alloy showed additional evidence that surface tension induced droplet migration had occurred in this alloy which could at least in part account for the observed structures.

N80-25355/2 PC **A02**/MF **A01**
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
F-104 Low-Gravity Calibration Tests for Materials Processing in Space Precursory Experiments.
R. M. Poorman. 5 Mar 80, 11p NASA-TM-78278

A precursory low-gravity flight experiment in an F-104 aircraft was conducted to check out the vehicle as a suitable flight test carrier for microgravity experiments. Calibration experiment verification tests in the F-104 were completed. Three flight parabolas were flown. The test data shows all the test parameters recorded by telemetry to have reasonable values. Photographic records are clear and distinct.Solidification modes were the same as those observed in other low gravity environments. The F-104 has been proven to be a useful test bed for low gravity experiments which require less than 60 seconds of low g time.

N80-25368/5 PC **A99**/MF **A01**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
Eps Analysis of Nominal Sts-1 Flight.
D. F. Wolfgram, and M. D. Pipher. May 80, 811p
NASA-TM-81001, JSC-16681

The results of electrical power system (EPS) analysis of the planned Shuttle Transportation System Flight 1 mission are presented. The capability of the orbiter EPS to support the planned flight and to provide program tape information and supplementary data specifically requested by the flight operations directorate was assessed. The analysis was accomplished using the orbiter version of the spacecraft electrical power simulator program, operating from a modified version of orbiter electrical equipment utilization baseline revision four. The results indicate that the nominal flight, as analyzed, is within the capabilities of the orbiter power generation system, but that a brief, and minimal, current overload may exist between main distributor 1 and mid power controlled 1, and that inverter 9 may the overloaded for extended periods of time. A comparison of results with launch commit criteria also indicated that some of the presently existing launch redlines may be violated during the terminal countdown.

N80-25371/9 PC **A12**/MF **A01**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
Sts-1 Operational Flight Profile. Volume 5: Descent, Cycle 3.
R. Moore, A. Baker, R. Hite, A. Hochstein, and J. Lyons. May 80, 254p NASA-TM-81077, JSC-14483
Supersedes T79-12405.

The trajectory data presented are to be used for orbiter systems and subsystems evalation, flight and mission control center software verification, flight techniques and timeline development, crew training, and evaluation of operational mission suitability. The entry profile is very similar to cycle 2, however, elevon and body flap temperature margins have increased and the elevon schedule was changed. The terminal area energy management (TAEM) profile was completely reshaped to conform with new angle of attack constraints and left hand turn around the heading alignment cylinder. Also, the entry/TAEM interface was adjusted to minimize guidance induced angle of attack transients across the interface. The approach and landing phase was reshaped for a 20 deg glideslope and reduced velocity at touchdown. The definition of the runway threshold was standardized for all landing sites. This results in a shift at Edwards Air Force Base in aim points and touchdown relative to the threshold of 1000 feet. The rollout remains essentially unchanged with the exception of the speedbrake, which is now deployed to 50 percent at touchdown.

N80-26056/5 PC **A04**/MF **A01**
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
User's Guide for Skylab Dynamics Program, SKYDYN.
M. S. Hopkins. May 80, 73p NASA-TM-78279

This user's manual describes the capabilities, required input data, and resulting output of SKYDYN, version of the 6 degree-of-freedom digital program REENTR which was extensively modified for the Honeywell CP-V system and was tailored to the specfic requirements for SKYLAB.

N80-26062/3 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
A Direct Search Procedure Using Linear Programming to Generate Numerical Suboptimal Solutions in Control Problems.
D. C. Ceballos, and A. R. Nero. Apr 80, 7p INPE-1725-RPE/130
Text in Portugese; English Summary. Proposed for Presentation at the 30TH Congr. Brasileiro de Automatica, Rio de Janeiro, 16-19 Sep. 1980.

A direct search procedure, of first order, using linear programming, is proposed to obtain numerical suboptimal solutions in dynamical systems control problems. A particular functional form, dependent upon a set of unknown parameters, is assumed for the control function. Due to its characteristics it can be used in small computers and to generate computer programs of general application. Considerations about the functional form of the control are given and the results of application to a Earth-Mars orbit transfer problem are presented.

22B. Spacecraft

AD-A084 810/1 MF **A01**
Air Force Geophysics Lab Hanscom AFB MA
Large Space Structure Charging during Eclipse Passage.
Air Force surveys in geophysics,
David M. Gauntt. 15 Jan 80, 39p Rept nos. AFGL-TR-80-0022, AFGL-AFSG-420
Availability: Microfiche copies only.

Much work has been developed to the study of the differential charging of geosynchronous spacecraft, primarily that charging caused by injection events and uneven illumination of isolated surfaces. However, as the lack of illumination in the penumbra eliminates the latter problem, little attention has been paid to charging during eclipse passage. For a sufficiently large structure (length greater than 1 km), the gradient of illumination in the penumbra is large enough to contribute significantly to differential charging. In this paper, three main subjects will be discussed: (1) the causes of charging at geosynchronous altitudes; (2) a simple model of the plasma from which the differential charging equations can be derived; and (3) the results of a computer program based on these equations, together with several theoretically fit sets of equations to approximate the results. (Author)

AD-A085 397/8 PC **A02**/MF **A01**
Cold Regions Research and Engineering Lab Hanover NH
Deicing a Satellite Communication Antenna.
Special rept.,
Ben Hanamoto, John J. Gagnon, and Blanchard Pratt. Apr 80, 17p Rept no. CRREL-SR-80-18

Ice buildup on communication antenna dishes begins to cause signal reception problems when the thickness exceeds 0.64 cm (0.25 in.). CRREL's copolymer coating, which reduces the adhesive force between ice and the coated surface, was tested on antenna dish panels to facilitate ice removal. A combination of the copolymer coating and heat proved to be an effective method of removing ice from the panel. (Author)

AD-A085 644/3 PC **A03**/MF **A01**
RAND Corp Santa Monica CA
A Preliminary Analysis of the Effect of Work-Arounds on Space System Performance and Procurement Requirements--A Proposal.
Interim rept.,
Gary Parish, and William Sollfrey. Mar 80, 31p Rept no. RAND/N-1260-AF
Contract F49620-77-C-0023

This note identifies a factor that appears to have been neglected in explaining the discrepancy between predicted and observed satellite lifetimes in orbit. This factor--extension of satellite life through ingenious 'work-around' corrections--is not represented in current satellite replenishment models. The note explores the effect of this omission on various measures of system performance, develops an analytical method of incorporating these work-arounds in replenishment models, and derives an initial estimate of the required parameters from a convenient data base. Incorporating the effect of work-arounds dramatically improves system performance and lowers procurement requirements. (Author)

AD-A085 654/2 PC **A04**/MF **A01**
Charles Stark Draper Lab Inc Cambridge MA
ACOSS Four (Active Control of Space Structures) Theory. Volume I.
Final technical rept. 24 Jul 78-31 Dec 79,
Robert R. Strunce, Daniel R. Hegg, Jiguan G. Lin, and Timothy C. Henderson. Apr 80, 67p R-1338, RADC-TR-80-78-VOL-1
Contract F30602-78-C-0268, ARPA Order-3654
See also Volume 2, AD-A085 816.

The objective of the research reported here was to develop the theoretical and analytical tools to sup-

port the successful implementation of active vibration control of large flexible spacecraft. Parallel efforts in theory and applications were initiated. For the theoretical effort, several representative design methods were selected for careful study focusing on an examination of the theoretical basis for each method and potential difficulties associated with their use in reduced-order large space structure controller design. The methods initially selected are characterized by constant-gain output feedback, the simplest form of active multivariable control; (1) Modal Decoupling, (2) Pole Assignment, (3) Optimal Output Feedback, (4) Suboptimal Output Feedback, (5) Stochastic Optimal Output Feedback. A performance comparison of specific designs with these methods was made. Extensions to the published Kosut methods of suboptimal output feedback are developed, as well as the details of an algorithm necessary for a numerical solution.

N80-25359/4 PC **A02**/MF **A01**
Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
The Electrostatic Potential of an Equatorial Satellite.
N. S. Venkataraman. May 80, 12p INPE-1749-RPE/142-REV
Revised. Submitted for Publication.

The surface electrostatic potential of a satellite moving with a constant velocity perpendicular to a constant magnetic field was calculated. The ion thermal motion and photoelectric currents were included. Nondimensional parameters were introduced. For large satellites, the nondimentsional potential varies linearly with the nondimensional maximum induced potential. The influence of ion thermal motion photoelectric effect on the satellite potential are of the same order.

N80-25369/3 PC **A06**/MF **A01**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
MCC Level C Formulation Requirements. Entry Guidance and Entry Autopilot, Optional TAEM Targeting.
J. C. Harpold. Apr 80, 116p NASA-TM-81072, JSC-16516
Supersedes Jsc-11746.

The level C software formulations requirements for the entry guidance and the simplified autopilot to be used by the Mission Control Center (MCC) entry processor are presented. The modifications required to functionally simulate optional Terminal Area Energy Management (TAEM) targeting capability (OTT) are incorporated. Implementation of this logic in the MCC must be coordinated with flight software OTT implementation and MCC TAEM guidance OTT. The entry guidance logic is based on the orbiter avionics entry guidance software. Descriptions of the entry guidance detailed formulation requirements, the detailed autopilot formulation requirements, and the targeting routine are given. Also included are a definition of coordinate systems, a list of parameter definitions for the software formulations, and a set of formulation flow charts.

N80-25370/1 PC **A05**/MF **A01**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
MCC Level C Formulation Requirements. Shuttle TAEM Targeting.
G. L. Carman, and M. N. Montez. Apr 80, 86p NASA-TM-80796, JSC-16522

The level C requirements for the shuttle orbiter terminal area energy management (TAEM) guidance and flight control functions to be incorporated into the Mission Control Center entry profile planning processor are described. This processor is used for preentry evaluation of the entry through landing maneuvers, and includes a simplified three degree-of-freedom model of the body rotational dynamics that is necessary to account for the effects of attitude response on the trajectory dynamics. This simulation terminates at TAEM-autoland interface.

N80-25372/7 PC **A05**/MF **A01**
National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
Orbiter/Shuttle Carrier Aircraft Separation: Wind Tunnel, Simulation, and Flight Test Overview and Results.
D. J. Homan, D. E. Denison, and K. C. Elchert. May 80, 88p NASA-TM-58223

A summary of the approach and landing test phase of the space shuttle program is given from the orbiter/shuttle carrier aircraft separation point of view. The data and analyses used during the wind tunnel testing, simulation, and flight test phases in preparation for the orbiter approach and landing tests are reported.

N80-25414/7 PC **A03**/MF **A01**
Martin Marietta Aerospace, New Orleans, LA.
Study of Etchants for Corrosion-Resistant Metals, Space Shuttle External Tank.
J. R. Simmons. 11 Jan 80, 26p NASA-CR-161431, ETTR-52
Contract NAS8-30300

Acceptable etchant concentrations and application and removal procedures for etching austenitic stainless steel, nickel base alloys, and titanium alloys (annealed) employed on the external tank were formulated. The etchant solutions were to be capable of removing a minimum of 0.4 mils of surface material in less than one hour.

SAND-79-1847 PC **A03**/MF **A01**
Sandia Labs., Albuquerque, NM.
Preliminary Experiments Using Light-Initiated High Explosive for Driving Thin Flyer Plates.
R. A. Benham. Feb 80, 36p
Contract EY-76-C-04-0789

Light-initiated high explosive, silver acelytide - silver-nitrate (SASN), has been used to produce simulated x ray blow-off impulse loading on reentry vehicles to study the system structural response. SASN can be used to accelerate thin flyer plates to high terminal velocities which, in turn, can deliver a pressure pulse that can be tailored to the target material. This process is important for impulse tests where both structural and material response is desired. The theories used to calculate the dynamic state of the flyer plate prior to impact are summarized. Data from several experiments are presented which indicate that thin flyer plates can be properly accelerated and that there are predictive techniques available which are adequate to calculate the motion of the flyer plate. Recommendations are made for future study that must be undertaken to make the SASN flyer plate technique usable. (ERA citation 05:021121)

22C. Spacecraft Trajectories and Reentry

AD-A084 806/9 PC **A03**/MF **A01**
Air Force Geophysics Lab Hanscom AFB MA
The Dynamics of a Rigid Body in the Space Plasma.
Environmental research papers,
Peter J. L. Wildman. 28 Aug 79, 36p Rept nos. AFGL-TR-79-0201, AFGL-ERP-673

The forces resulting from the passage of a conducting body through a partially ionized plasma are reviewed, with emphasis on large space structures. The forces include drag and torque from a number of independent mechanisms, including collisions with neutral and charged particles, solar radiation pressure, and interaction with the earth's magnetic field. The desirable economic lifetime of tens of years for a large space structure implies an orbital altitude of at least 1000 km, and more probably a geosynchronous orbit (6.6 R sub e). Drag forces are, therefore, unimportant, except during assembly in low earth orbit and when they generate torque because of a special structure or attitude geometry. For large, long structures with dimensions on the order of kilometers and mass on the order of 10 to the sixth power kg or more, the gravity-gradient-induced torque dominates all others even at geosynchronous-orbit altitudes. The magnitudes of the various forces are calculated for a non-rotating structure, 2 km long and 10 m wide, at altitudes between 250 km and 36,000 km (6.6 R sub e) above the earth. A short appendix lists additional mechanisms that act when an orbiting body has rotational as well as translational motion. (Author)

AD-A085 348/1 PC **A04**/MF **A01**
Royal Aircraft Establishment Farnborough (England)
Second-Order Perturbations Due to J2, for a Low-Eccentricity Earth-Satellite Orbit.
Technical rept.,
R. H. Gooding. Aug 79, 74p RAE-TR-79100, DRIC-BR-71411

The second order perturbations of J sub 2 in the orbital elements of an earth satellite are analysed by an elementary treatment that neglects terms of second order J sub 2. The resulting expressions are combined into a triad of cylindrical polar coordinates, defined by a plane of fixed inclination and uniform rotation rate, since this leads to very simple formulae for perturbations in coordinates.

N80-25366/9 PC **A03**/MF **A01**
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Dynamik der Flugsysteme.
A Method of Producing Analytical Orbit Models for Geostationary Satellites.
M. Eckstein. Aug 79, 31p DFVLR-FB-79-16, ESA-TT-643
Text in German; English Summary. Report Will Also Be Announced as Translation (Esa-TT-643).

A simplified perturbation theory of nearly geostationary satellites is described. The analytical form of the perturbations is derived from geometrical considerations and the coefficients are determined using multiple Fourier analysis. The resulting single formula avoids singularities for zero eccentricity and inclination. A computer program is used to evaluate the formula.

N80-26238/9 PC **A03**/MF **A01**
Old Dominion Univ. Research Foundation, Norfolk, VA.
Laminar and Turbulent Flow Solutions with Radiation and Ablation Injection for Jovian Entry.
Final Report, period ending 29 Feb. 1980.
A. Kumar, and S. N. Tiwari. May 80, 40p NASA-CR-163215
Grant NSG-1464

Laminar and turbulent flow-field solutions with coupled carbon-phenolic mass injection are presented for the forebody of a probe entering a nominal Jupiter atmosphere. Solutions are obtained for a 35-degree hyperboloid and for a 45-degree spherically blunted cone using a time-dependent, finite-difference method. The radiative heating rates for the coupled laminar flow are significantly reduced as compared to the corresponding no-blowing case; however, for the coupled turbulent flow, it is found that the surface radiative heating rates are substantially increased and often exceed the corresponding no-blowing values. Turbulence is found to have no effect on the surface radiative heating rates for the no-blowing solutions. The present results are compared with the other available solutions, and some additional solutions are presented.

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